THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIV. No. 599.] LONDON, NOVEMBER 3, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 28-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES. GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
(Mixed ready for use).
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
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SPECIALITIES IN WOOD
FOR
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MADE FROM THE BEST QUALITY
OF
WELL-SEASONED PLANKS.
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
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GAS ENGINEERS AND COAL FACTORS,
OF
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CONTRACT FOR SUPPLYING ANY QUANTITY OF
GAS, HOUSE, and STEAM COAL, and CANNEL;
Also for every sort of Gas Apparatus and Fire Goods.
MESSRS. ROMANS, being lessees of several Gas-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
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PATENTEES OF THE
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For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
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G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

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MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

CAFFALL, THOMAS, & CO., LIMITED.

PATENT IMPROVED SEAL

FOR

GAS HYDRAULIC MAINS.

SAVES COAL, RETORTS, FUEL, LABOUR, TIME, SPACE, AND CAPITAL.

PREVENTS STOPPAGE OF ASCENSION-PIPES, DEPOSITION OF CARBON IN RETORTS, THICKENING OF TAR IN HYDRAULIC MAIN.

GIVES MORE GAS PER TON OF COAL, WITH HIGHER ILLUMINATING POWER, SATISFACTION, AND PROFIT TO SHAREHOLDERS AND MANAGERS.

IS STRONG, SIMPLE, EASILY FIXED AND WORKED, AND THOROUGHLY EFFICIENT AT ALL TIMES.

TESTIMONIAL.

Gas-Works, Guildford, Sept. 15, 1874.

GENTLEMEN,—The five retorts fitted with your Patent Moveable Seal for Dip-Pipes, on June 30, have been in constant use since that date, and have worked in a most satisfactory manner.

These Retorts are still quite clean and free from carbon, whilst others not so fitted, after being at work eight weeks, required scurfing, having a deposit of carbon 2 inches in thickness on the inside.

I also find a slight increase in the yield of gas per ton of coal carbonized, although your Patent Seals are fitted to but one-fifth of the Retorts now at work.

As your statements respecting your apparatus are fully confirmed by the results obtained in practical working, I should wish you at once to fix one to each of the ovens at these works, that I may obtain all possible advantage during the coming winter.

Yours truly,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street, E.C. Jos. SHAW, Manager.

MODELS MAY BE SEEN, AND INFORMATION OBTAINED, AT THE OFFICES, 28, GRACECHURCH STREET.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

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GAS-FITTERS TOOLS, VALVES, COCKS, &c.

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MANUFACTURERS OF

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PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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COOMBS WOOD PATENT TUBE-WORKS,

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MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

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IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

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MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

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Drawings and Prices upon application.

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LANCASHIRE GAS-METER COMPANY,

LIMITED,

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THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

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FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

The F. I. Co. have the exclusive right to make and sell Fraser's Patent "Ribbed" Gas-Retorts in Fire-Clay.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

Apply as above, or to the London Offices, 15, NEW BROAD STREET, E.C.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

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TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

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Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,

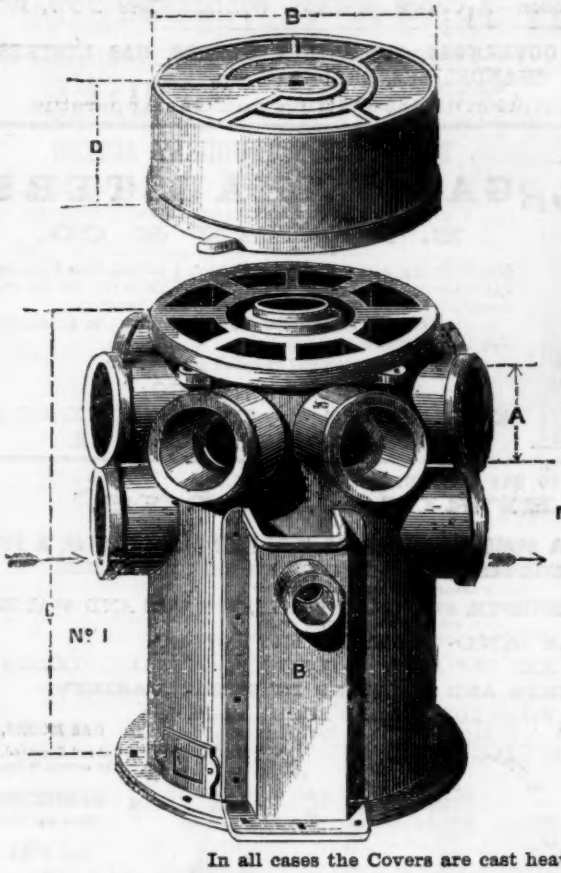
Has all the appearance of a Bright Fire.

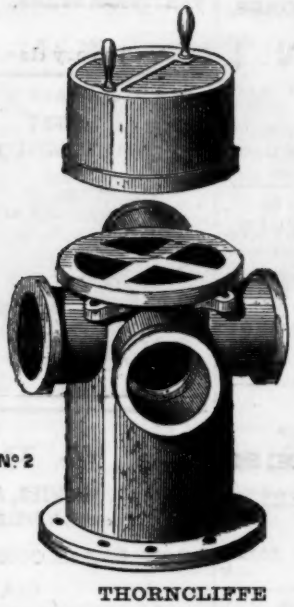
PRICE from 32s.

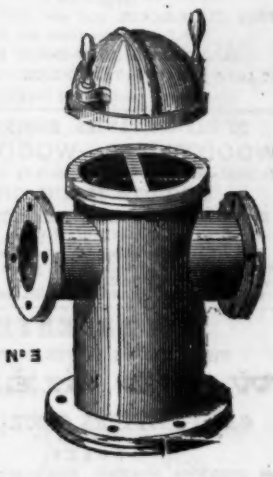
MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.







THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

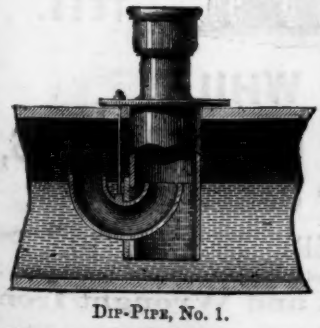
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

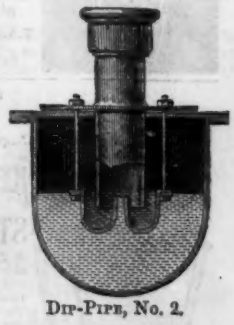
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

Messrs. NEWTON, CHAMBERS, & CO., Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

J. G. HAWKINS, NEEPSEND GAS-WORKS, SHEFFIELD.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD
CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

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THE HURST
FIRE CLAY and BRICK WORKS,
STOURBRIDGE.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
Manufacturers for Home and Export.
GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, & TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

TO GAS COMPANIES, ENGINEERS, &c.
WOOD SIEVES.—WOOD SIEVES.
Estimates given and Contracts taken by the Manufacturer
GEORGE MACKANESS,
36, EDWARD STREET, HAMPSTEAD ROAD,
LONDON, N.W.
These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.
N.B.—Specimens sent free on application.

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THE ORIGINAL MANUFACTURER OF
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FOR
GAS PURIFIERS & SCRUBBERS.
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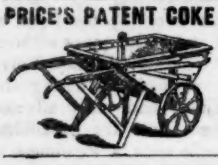
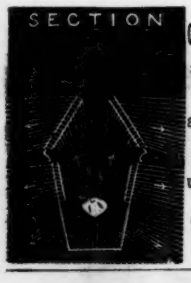
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
WROUGHT AND CAST IRON GIRDERS.
DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

PRICE'S PATENT COKE & COAL BARROW.

effecting a great saving of time, labour, and expense.
For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.



THE PATENT
CATOPTRIC LAMP
Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
T. A. SKELTON, 37, Essex St., Strand, LONDON,
INVENTOR AND PATENTEE.

GAS COMPANIES
AND
LOCAL BOARDS
Requiring New Street-Lamps are recommended
A **KEEN'S PATENT**
DOUBLE-CLIP
STREET-LAMP.
A great improvement on the old-fashioned 14-in. Lamps.
They have been sold to various Gas-Works throughout
B the country and abroad, and the highest satisfactory testimonials are given as to their superiority.
For particulars of price, &c., apply to
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JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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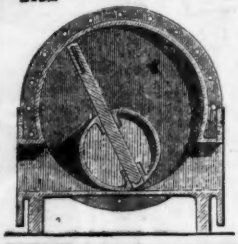
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.
STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

TRADE MARK
J. BEALE'S
PATENT
GAS EXHAUSTER.

BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.
MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.
Estimates and Prices on application to
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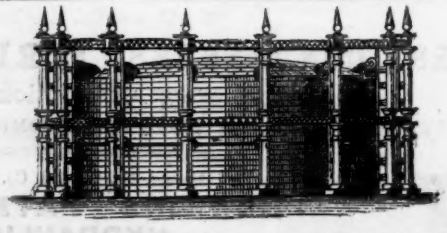
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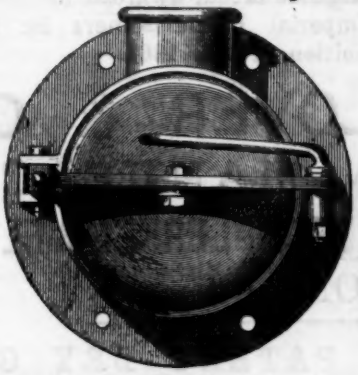

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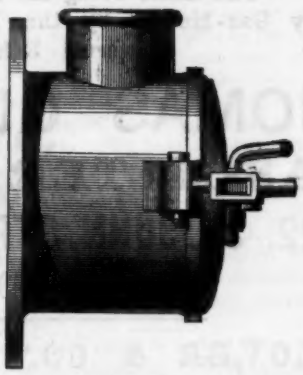

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These Lids are Adopted by the following (among many other) Gas Companies —

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
„ Gaslight Company, Bow Common.	„ Imperial Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ Merthyr Tydfl. Gas-Works.
„ London Gaslight Company.	„ Gas-Works, Arsenal, Woolwich.	„ Liverpool United Gas-Works.	„ Ystrad Gas-Works.
„ Independent Gaslight Company.	„ Commercial Gas Company.	„ Birkenhead Gas-Works.	„ St. Alban's Gas-Works.
„ Phœnix Gaslight Company.	„ Alliance and Dublin Gas-Works.	„ Birmingham Gas-Works.	„ Over Darwen Gas-Works.
„ South Metropolitan Gaslight Co.	„ Edinburgh Gas-Works.	„ Nottingham Gas-Works.	„ Aylesbury Gas-Works.
	„ Manchester Corporatn. Gas-Works.	„ Newcastle-on-Tyne Gas-Works.	„ Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

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(Commonly called the Chartered Gas Company),

BECKTON, NORTH WOOLWICH, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,

(Signed) G. C. TREWBY.

P.S.—We shall have very shortly about 3000 of your Lids in use.

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The following are a few of the leading Sizes:—

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3	1½	9	550	£16
4*	2	9	970	18
3	3	9	2,200	18
4*	3	12	2,200	20
6*	3	12	2,200	25
4	4	12	3,900	25
6*	4	12	3,900	30
6	5	12	6,100	35
7*	5	12	6,100	40
6	6	12	8,800	40
8*	6	12	8,800	50
7	7	12	11,900	50
10	7	12	11,900	65
8	8	18	15,660	65
10	8	18	15,660	75
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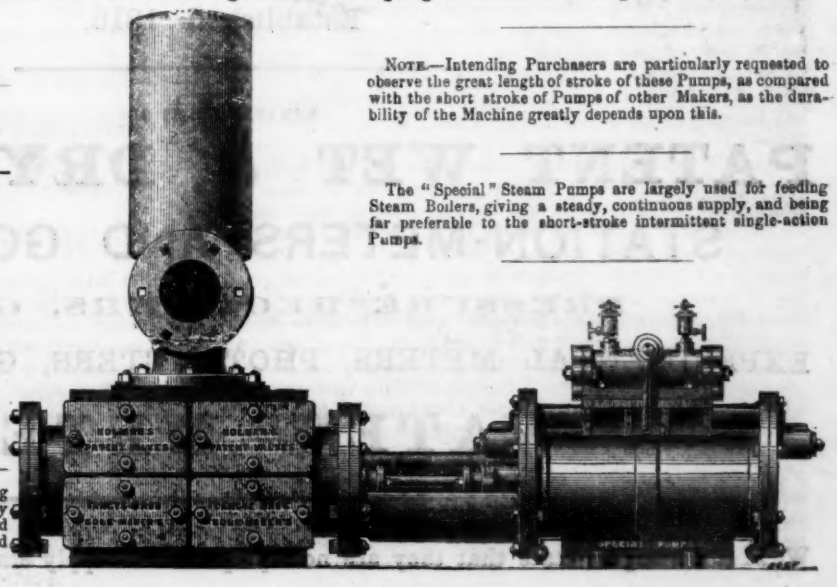
* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

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Dublin, 1865.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

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2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

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Established 1816.

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STATION-METERS AND GOVERNORS,

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EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c., &c.

WATER METERS.

W. P. & Co. beg to state that they are now prepared to supply Station-Meters with planed joints.

CONTENTS.

	PAGE
Circular to Gas Companies:—	
The Proceedings of the Corporation and the Metropolitan Board	597
The Municipal Reform Association and the Home Secretary	597
The Gas Accounts of the Corporation of Aberdeen	598
Gas Affairs at Sevenoaks	598
Chelsea and the Average Meter System	598
Gas Affairs at Sheffield	598
The Pitch of Screw for Iron Tubing	598
How to Test Street-Lamps	598
Water and Sanitary Notes:—	
Economy of a Constant Water Supply	598
New Supply of Water for Haddington	598
Water Affairs at Hull	598
The Croydon Sewage Farms	598
Bradford Sewage	599
Leading Article:—	
A Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas	599
Communicated Article:—	
Gas Lighting, Sanitary Matters, &c., in France	600
Correspondence:—	
Street-Lamps	601
Pelouze and Audouin's last Patent	601
Relative Price of Commercial and Chartered Gas	601
Exhauster Regulators	602
Legal Intelligence:—	
Cambridge Borough Sessions—The Alleged Embezzlement from the Cambridge Gas Company	602
Civil Bill Court, Dublin—Gatchell *v.* Corporation of Dublin	602
Greenwich Police Court—Houseowners Liabilities to Water-Rates	602
West Riding Police Court, Bradford—Illegal Appropriation of Water	602
Miscellaneous News:—	
Metropolis Gas Supply	602
Metropolis Water Supply	603
Winchester Water-Works	603
Halifax Corporation Gas-Works	603
Foreign and Colonial Gas Company, Limited	603
Hills's Improvements in the Purification of Gas and Gas Liquor	604
Gas Lighting in Liverpool	605
West of Scotland Association of Gas Managers	605
North Shields Water Company	606
Aberdeen Corporation Gas Supply	606
Cromer Gas and Coke Company, Limited	606
Kilbarchan Gas Company	606
Meeting of the Bahia Gas Company	607
Meeting of the Singapore Gas Company	607
American Water Gas Researches. By Professors Würtz and Silliman	608
Natural Gas in the Conemaugh Valley, Pennsylvania, U.S.A.	610
Names of Streets on Public Lamps	610
Iron and Coal Trades of Sheffield, South Yorkshire, and North Derbyshire	610
Iron and Coal Trades of South Staffordshire and East Worcestershire	610
Iron and Coal Trades of Lancashire	610
Coal and General Trade of the North	611
Reductions in the Price of Gas	611
Advance in the Price of Water at Ilkeston	611
Nottingham Corporation Gas Supply	611
Pneumatic Gas	611
Elgin Water Supply	611
Validity of Gas Companies Notices	611
Ashton-in-Mackerfield Gas Consumers Company, Limited	611
New York Public Lighting	611
Register of New Patents:—	
Beck, W. H.—Gas Making	611
Forbes, G. H.—Fuel and Gas Making	611
Weston, J. H.—Gas Making and Lamps	611
Goold, G.—Cocks or Valves	611
Haseltine, G.—Dry Gas-Meters	612
Willoughby, Southwell, Briggs, and Willoughby—Distilling Tar	612
Cook, H. W.—Pumping or Forcing Water, Air, Gas, &c.	612
Warner, W. J.—Gas-Retorts	612
Newton, A. V.—Pumps	612
Bayley, G. H. and H. D.—Taps or Valves	612
Hunter, A. G.—Carburetting Air	612
Newton, A. V.—Gas-Retorts	612
Hills, F. C.—Gas and Gas Liquor	612
Holland, H.—Carburetted Air	612
Teulon, G. A.—Cylinder Engines and Pumps	613
Alliott, J. B.—Engines, Pumps, and Meters	613
Warner, W. J.—Gas-Meters	613
Mirrlees, J. B.—Pumping Engines	613
Applications for Letters Patent	614
Grants of Provisional Protection	614
Notices to Proceed	614
Patents which have passed the Great Seal	614
Patents which have become void	614
Notes and Queries	614
Share List of Metropolitan Gas and Water Companies	613

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 3, 1874.

Circular to Gas Companies.

THE report circulated by the *Daily News*, and referred to in our last, that the Metropolitan Board of Works had decided on postponing parliamentary action on the gas question, is contradicted by the fact that, last week, a deputation of the Board, headed by the chairman, had an interview with the Gas Committee of the Corporation, the object of which was to ensure united action. We are told that the conference, which lasted some hours, was of a most cordial character. We can easily believe it. The committee of the Corporation must have been hugely flattered by the attendance of Sir James Hogg. His presence alone was sufficient to secure perfect unanimity, and so we suppose the two "governing bodies" will proceed hand in hand on the most nefarious enterprise either has yet entered upon. We read, "It is believed "that they (the governing bodies) will succeed in saving the gas "consumers and ratepayers at least a million of money per annum "by reducing the price of that all-important article of daily con-"sumption" (gas). Since the net profits of the gas companies do not amount to very much over half a million per annum, it is clear that some people expect to be supplied with gas at something less than cost price.

Mr. Henry Cole, C.B., is not quite so unreasonable. He wants gas at cost price, which he cannot have. Even if the new municipality he and we wish for should be constituted, Mr. Cole and the silly writer we have quoted above are indulging hopes that can never be gratified, and if either thought at all about the question he would see that they ought not to be gratified. The manufacture and distribution of gas, whether in the hands of companies or a Corporation, must be conducted on commercial principles or become a burden on the rates. It must be explained to the metropolitan gas consumer that he must pay either in "meal or malt." He may have cheap gas and high rates, or dear gas and low rates, according to his preference; but, unless we are greatly mistaken, he will never in this metropolis have cheap gas and low rates. We have only recently had occasion to notice the case of a Corporation who indulged themselves with a supply of cheap gas, and now require a rate of 5s. 10d. in the pound to make good the loss occasioned. Something like that must happen here, if Mr. Cole, C.B., should ever get his gas at "cost price;" and will, we venture to predict, inevitably follow whenever the gas supply of the metropolis gets into the hands of a Corporation, if that body should determine on supplying cheap gas.

There is not much to be said about the interview of the deputation of the Municipal Reform Association with Mr. Secretary Cross. Lord Elcho did his part extremely well—much better, in fact, than we anticipated—making some very good points, and very wisely masking some others. The control of the police, which Mr. Chamberlain Scott appears to think the essence of self-government, is a matter of very small importance, when considered in connexion with the other great interests at stake. The custody of the Sovereign, the guardianship of the Legislature, and the safe keeping of four millions of people, may well be considered national duties, and we do not see any difficulty in providing for these while settling a scheme for what shall be, in fact, the efficient self-government of the metropolis. We have mentioned before the peculiar notion of Mr. Henry Cole, C.B., who wants gas and water at cost price, and a good deal more, which even a municipality will be slow to give him. His ideas are, however, excellent in their way; but he has a very odd way of stating them. Major Lyon ventured a supposition, that the Metropolitan Board of Works would be glad to commit the "happy despatch," for which he has been taken to task by a leading member of the Board, who would appear to be anxious to perpetuate its existence. Whatever may be the immediate fate of the Municipal Bill under consideration, there can be no doubt of the ultimate and not distant fate of the Metropolitan Board of Works. There may be a difference of opinion as to the best form of Government for London, but there is none as to the fact that the present constitution of the Board of Works is essentially vicious, and must be remodelled if not abolished. Delegates of vestries will not be much longer tolerated, even if vestries are allowed to exist. The simple circumstance that only 1000 men elect the body who have in some sort the interests of 3¼ millions of people in their keeping, is sufficient to condemn the system. But why Mr. Newton should be especially desirious for the continued existence of the Board we cannot guess. He is one of the best business men, and in many respects the very best speaker on the Board; and if he would only distribute his aspirates according to accepted usage, and would adopt the rules of syntax laid down by grammarians of established repute, he would be an ornament to, as he would certainly be a power in, such a metropolitan Town Council as we hope to see some day elected. Mr. Beal brought the proceedings on the part of the deputation to an eloquent termination, and it only remained for Mr. Secretary Cross to play the part of the parrot, who, not gifted with eloquence, was credited with the power of thinking profoundly. The ultimate result must depend on the action of the Government. It was clearly admitted by Lord Elcho that a Bill like this for creating a municipality of London, has no chance of success in the hands of a private member, and if the Cabinet cannot be persuaded to take it up, the matter might be dropped, if it were not well that the question should be forced upon the public mind for a solution. The Municipal Reform Association has much hard work still to do. We are inclined to think that the Government will adopt their measure in a lukewarm manner, ventilate it, and endeavour to gauge the feeling of the metropolis on the question. It must be the object of the association to rouse the popular feeling, and bring some pressure to bear on a Government called into power to redress

the wrongs of the publicans, and to do—nothing. As regards our particular interests, we know that they are safe under any circumstances. Whether London be granted an efficient municipal government or not, we know well that Parliament, as at present constituted, will not for a moment entertain any scheme for the confiscation of private property.

The gas accounts of the Corporation of Aberdeen for the past year show that the profits are not quite sufficient to provide for all the charges on the undertaking. The deficiency, however, is but £221, which possibly the Corporation may make up next year. But as the Aberdonians will have 30-candle gas, and only pay 5s. per 1000 for it, and as cannel coal, such as is required for gas of the above quality, does not go down in price, it may be that the Corporation will have to put up with further losses, or raise the price of gas. We would strongly recommend them to lower the quality. It is impossible to suppose that the ordinary consumer in Aberdeen gets the full advantage of this rich gas, and we are certain that Aberdeen could be just as well lighted with a cheaper gas.

There is a chronic dissatisfaction with the gas supply at Sevenoaks, and the gas company seem to admit that all the complaints brought against them are just. The gas is poor in illuminating quality, excessively impure as regards ammonia and "sulphur," and actually now and then contains sulphuretted hydrogen. At the same time the price is high. We do not know the charge to-day; but it used to be 5s. 5d. for gas of a little over 12-candle power. The discontent has existed now for some years, and the directors have, it would seem, done nothing to remove it. Having now, once again admitted, by the mouth of their engineer, that the gas is "very bad" at times, we do hope that for the credit of our common industry the directors will at once proceed to remove the grounds of complaint. It costs but little to remove sulphuretted hydrogen, and it is profitable to take out ammonia. As regards illuminating power and price, the directors will, of course, do the best they can. We know of no reason why gas should be especially dear at Sevenoaks.

The Vestry of Chelsea seem inclined to adopt the average meter indication system. The "gas analyst" of the parish, who ever he may be, recommends, however, that for the next twelve months the governors of the public lamps should be tested occasionally, and that, at the end of that period, Chelsea should ask Paddington and St. Pancras for the results of their experience with the average meter plan. Chelsea had better at once adopt the average system. The London Company, though not bound to accept it, would not, we venture to think, object.

A certain clique in Sheffield are doing their utmost to drive the Corporation of the borough to make another attempt at the confiscation of the gas undertaking. We do not think the Corporation will be so foolish as to make it. "Once bit, twice shy," is a homely but expressive proverb. The time may come when the company will fall naturally into the hands of the Corporation, but the agitation, which always becomes loudest at this time of the year, is the last thing that can hasten the transfer.

Some silly speculations of the Registrar-General, as to what might have happened if, in years long gone by, London had had an intelligent municipal organization, and had started gas and water works, are put forward to-day as a proof of the financial advantages to be gained by the acquisition of such undertakings. But we have to deal with things as they are, and not as they might have been. The Corporation of Sheffield may some day get possession of the gas and water works by paying a proper price, and they may raise the money at 4½ per cent. to pay the cost; but every one must see that the consumers of Sheffield cannot profit by such a transaction. Gas and water could not possibly be cheaper for a generation to come, and what the condition of the gas industry will be at the expiration of that period who can foretell? To the ratepayers of Sheffield, as well as the metropolis, and as regards gas affairs, we may say that they will find it better to bear the ills they have, than fly to others that they know not of.

A point raised at the meeting of the West of Scotland Association of Gas Managers, the report of which we continue to-day, deserves something more than a passing notice. It is in the highest degree desirable that a common agreement should be entered into by the Scotch and English iron tube makers to ensure an uniform pitch of screw. The English tube manufacturers, by far the more numerous and important, have adopted one uniform pitch; but we read, to our astonishment, that every Scottish maker has a pitch of his own. This is a selfish and shortsighted proceeding which we hope our canny northern brethren will immediately alter, if for no other reason, that the practice followed shuts them out completely from the English market. The matter was pre-eminently one for the Association to deal with, and we hope the mere statement of the grievance in our columns will at once lead the Scotch tube makers to adopt universally the English pitch.

The letter of our correspondent, "Light," seems to ask from us a word of explanation. We do not pretend to use a photometer in testing street lights. Our practice, when comparing lamps, is to take a book of uniform print, and commencing to read under each lamp, step away, as near as possible yard by yard, counting the number of paces at which the print becomes illegible. We invite any disinterested person to apply this test to the lamps which are now competing in the streets of the metropolis, and give us their results. One thing must be carefully attended to: the lamp selected for experiment must be free from the disturbing influence of any private light. The point to be kept in view by makers of street-lamps is to obtain the maximum of lateral illumination. We do not want to light the sky—the stars may do that; nor do we care to encourage a habit such as that of a rich old lady we wot of, who finds that a street-lamp opposite her house saves her the expense of carrying a candle to her bed-room. There is another test as good as the reading test just described. Let any one measure the greatest distance from a lamp-post at which he can distinctly recognize the features of any passer-by coming from the opposite direction.

Water and Sanitary Notes.

It is with some astonishment that we read in a leading scientific journal the statement that the "constant service of water has "one serious defect, and that is that it undoubtedly increases to an "enormous extent the consumption of water." Now this is exactly the reverse of true. Wherever a constant service has been introduced, with proper fittings and regulations, a great economy has invariably resulted. Look at Norwich and Nottingham, and remark the change being made in Liverpool at the present time. Glasgow tells a different tale, but then the authorities, believing their source to be inexhaustible, took no precautions, and now seem powerless to effect necessary changes. In this metropolis we have no doubt that the change to a constant service, now being cautiously carried out, will lead to a great saving of water. From our own observation we are satisfied that at least 25 per cent. of the water now supplied in the older parts of the metropolis dribbles away to no useful purpose. Under present arrangements the leakage is unseen and causes no discomfort, unless, as not unfrequently happens, a cistern, large enough to contain two or three days supply, which was filled at noon on one day, is found the next with not sufficient for the morning's requirements. Under the constant system the leakage is patent and must be remedied, or the householder will suffer. For the reasons that an economy of water and an increase of comfort will result, we rejoice at the gradual extension of the constant service system now being made by the metropolitan water companies, and most notably by the East London Company, and we believe that a wider study of the question will convince our contemporary that a constant service system will not necessarily lead to an enormous increase in the consumption of water.

Haddington has had a day's rejoicing on the occasion of the opening of a new water supply. Originally the town was supplied from the Tyne, but the water of the river became polluted, and a new source has been found in some soft-water springs about four miles distant. The works are of an extremely simple character, the levels admitting of a supply by gravitation.

Hull, we are sorry to see, has not yet the benefit of a continuous supply, and, as the engines are in a "lamentable condition," is not likely to have it for some time to come.

The commencement of a sewage discussion is like the letting out of waters. When Mr. Alfred Smee and Dr. Carpenter begin writing letters to the newspapers, we know they will only end when the patience of the editors is exhausted, the patience of the readers having been exhausted long before. As regards the sanitary state of the Croydon sewage farms, different statements have been made, but on the whole we are disposed to regard it as not unsatisfactory. With reference to the financial results of the farming operations carried on, we are still in doubt, and we should be very glad if some one would give us a clear and distinct statement. Dr. Carpenter says:

> We have 176 acres of rye-grass, which, in most of the plots, has been cut at least six times this year; we have upwards of 50 acres of mangolds, which can scarcely this year be equalled in size and quality; we have 82 acres under market-garden cropping, producing immense quantities of garden produce; and we have consumed within our own borders the milk from more than 40 cows without injury and without complaint of nuisance from any one except those who have no real interest in the question; with the anomaly, if nuisance did exist, of a low death-rate and a fairly high birth-rate, not only in our town itself, but in close proximity to our sewage farms.

But, after all, it may be asked, is the game worth the candle? Do the farms pay, and is there any actual gain to the community from their existence?

The Town Council of Bradford have for the present adopted a system of sewage purification, invented or discovered by a Mr. Alsing, a Dane. Of course, the materials employed are kept secret, but it is a precipitating process, and everybody knows that any one of the scores of such processes experimented with, will give a clear effluent if time for settlement be granted. The council have no present intention of utilizing or further purifying the sewage, and, therefore, we may conjecture that the injunction in Chancery which now hangs over their heads will continue to depend.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXXVII.

PURIFICATION.

From the very earliest experiments of Murdoch, the necessity of purifying coal gas was made evident. We may suppose that this was suggested in the first instance by the smoky appearance of the flame as the gas was consumed in the primitive burners, and by the nauseous odour arising from the gas when escaping from the pipes without being burnt. But it does not seem that any apprehensions existed at the time of the impurities being insalubrious, nor was this amongst the objections raised by the opponents of gas lighting; since then, however, scientific men have at times magnified the effects of these impurities to a wonderful extent, but without tendering sufficient proof of the correctness of their assertions.

According to Creighton, the first attempt at purification consisted in washing the gas with water. Matthews states that Murdoch, during his experiments, succeeded in removing all the disagreeable odour from the gas, but that when thus purified, it gave very little light. Since that period, other clever minds have been occupied in endeavours to attain a similar object—namely, to remove the odour from coal gas. But never was labour and intelligence more misapplied; for, supposing the object to be accomplished without in any way prejudicing the quality of the gas, then the danger attending its use would be such as to realize all the most extravagant predictions of the first antagonists to this description of artificial light. The peculiarly disagreeable odour of coal gas, when unconsumed, has been the greatest safeguard in its use, and deprived of this it could not possibly have been generally applied, on account of the numerous accidents to which its employment would inevitably have led.

The attention of Mr. William (afterwards Dr.) Henry, of Manchester, one of the most advanced chemists of his day, being directed to gas lighting, towards the end of 1804 he delivered a course of lectures on chemistry, and exhibited the manner of producing gas, together with the mode of burning it in an Argand burner. Subsequently he entered into numerous experiments in order to ascertain the chemical properties of coal gas, and thus acquired a thorough knowledge of its constituents, and some of the principal circumstances on which depended its superior capacity for affording light. Amongst scientific men, Mr. Henry was one of the strongest supporters of gas lighting, and from the interest he took therein, his great researches in reference thereto, and his chemical knowledge, there is every reason to believe that to him we are indebted for the earliest suggestion of the use of lime as a means of purifying gas.

Clegg first applied lime as a purifying agent in the apparatus for lighting the dwelling of Henry Lodge, Esq., at Halifax, in 1806. For this purpose the lime was introduced into the gasholder-tank, where, of course, it settled at the bottom, and simply exercised its influence on the water therein, and as this would absorb only the most insignificant portion of the impurities of the gas, the lime, as thus applied, was altogether useless. Three years afterwards, when constructing the apparatus for supplying Mr. Harris's establishment at Coventry, Clegg introduced a paddle at the bottom of the tank, to agitate the lime, and the same year he employed a separate lime machine as a purifier, which was erected at the works of the Stoneyhurst College, Lancashire.

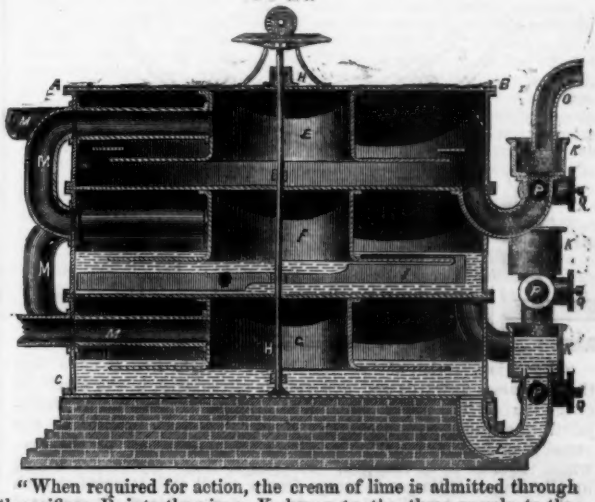
The first patent in connexion with this subject was obtained by Edward Heard, who had been the assistant of Winsor, who read his lectures at the Lyceum Theatre, and who afterwards became the rival of his former patron by lecturing on gas in the provinces, adopting the motto "*Ex fumo dare lucem*," originally applied by Winsor, to the great mortification of the latter, as expressed by him in one of his pamphlets.

Heard's patent was for "certain means of obtaining inflammable gas from pit coal in such a state that it may be burned without producing any offensive smell," and it is described as follows:—"The object of this invention is to withdraw the sulphur from gas obtained from coal, and for this purpose the patentee stratifies lime with the coal in the retort, stove, or other close vessel, in which they are placed for operation, or suffers the gas, when produced, to pass over lime previously laid in an iron or other tube, or any other shaped vessel adapted for the purpose, and exposed to heat." We may here observe that there is a striking similarity in the operation thus described and the invention for which a patent was obtained some months ago, and which excited a degree of public attention. Heard also proposed to substitute for lime "such metals or their oxides, as iron, manganese, zinc, copper, lead, &c." Here we have mentioned for the first time the use of oxide of iron as a purifier, which material has since then become so universally employed for the purpose. However, it appears that Heard followed no principle in defining the different purifying agents, but seems to have chosen them at hazard.

In 1808 Winsor patented the means of "refining inflammable air or gas, so as to deprive it of all disagreeable odour during combustion, and rendering the gas itself salutary for human respiration when properly diluted with atmospheric air." The following year he acquired another patent, in which he repeated the principal points of the former, but added that he proposed to pass the gas "through coolers, and then through vessels filled with lime water or cream of lime, which will withdraw the sulphur and other offensive particles." Hence we find that Winsor's patent was obtained the same year that Clegg practically adopted the lime machine; whether the circumstance was accidental or otherwise it is difficult to say. The earliest illustrations of gas-works represent the lime machine as a cylindrical vessel, placed in the centre of the yard, about 3 feet in diameter, having a crank handle for the purpose of agitating the lime. Subsequently it was driven by the station-meter, and necessarily the pressure on the retorts was much increased, with all its attendant drawbacks—a point which was only understood after the experience of many years.

The advantages of the cream of lime for purifying gas being recognized, John Malam applied himself to the construction of an apparatus, represented in the engraving, suitable for carrying on the process with all economy and efficiency. The sketch is copied from Peckston's "Practical Treatise," published in 1819, where it is described as "a vertical section of a treble purifier, placed on a foundation of brickwork. E E, F F, and G G, are the three interior chambers, bolted to the top of the respective vessels by the flanges shown on the plate. It will be observed that the bottoms of these vessels branch out with a kind of flange, by which means the gas is acted upon by a greater portion of the purifying mixture than if the side of it fell in a perpendicular line. H H, is the axis on which the agitator, I I, is fixed." Two of these are not shown, as they are omitted on the original. "K K K, are the cylindrical vessels, into which the purifying mixture is admitted by the bends, L L L. M M M, are the pipes which convey the gas into the interior chambers, whence it passes, after purification, by the pipe, N, to the gasholder. O, is the feed-pipe for conveying the purifying material from the vessel, where it is prepared, into the apparatus; P P P, are openings for supplying the respective vessels by the slide-valves, Q Q Q. In the drawing, the height to which the purifying mixture rises is shown in the two lower vessels, but the upper one is not charged. The agitator is driven by hand."

FIG. I.



"When required for action, the cream of lime is admitted through the orifices, P, into the pipes, K, hence to the three vessels to the height indicated. The gas enters the lower interior vessel, G G, and forcing its way through the liquid, passes under the dash-plate, and by means of the bent pipe, M, enters the vessel, F F, where the action is repeated, and the gas escapes into E E, and so off by the pipe, N, to the gasholder. When the lime in the machine becomes foul, that in the lowest compartment is allowed to flow away, and is replaced by that in the second vessel, which is then filled by the contents of the third, the latter vessel being supplied with fresh material." The principle here described is still retained in the construction of wet lime purifiers whenever they are employed, but instead of being combined in one vessel, they consist of three distinct apparatus in combination with each other, as hereafter shown.

A great progressive step in purification was introduced by Reuben Phillips, of Exeter, who, in 1817, obtained a patent "for a new and improved method of purifying gas for the purpose of illumination." He says: "I take any quantity of well-burnt lime, and pour water upon it until it falls into powder. I then mix it with a further quantity of water, in order to bring it into such a state that the particles of lime may adhere slightly to each other, but not to such a degree as to prevent the free passage of the gas between them. This mixture must be placed six inches deep, more or less, on moveable perforated shelves, in a vessel, the top of which is guarded by a water joint, and underneath is a pipe to allow the passage of the gas that way, so as that the gas may pass from the bottom of the vessel to the top through the perforated shelves and lime mixture, or from the top to the bottom, as may be found most convenient, the purification being effected by the gas being caused to pass through the layers of lime mixture; but where the quantity of gas to be purified is very large, I arrange a set of these vessels, consisting of five or nine, or more, according to the size of the gas-works, each

vessel containing one or more shelves. These vessels are placed in any way which convenience may require, but I prefer a circular arrangement, described as follows, and which the annexed plan exemplifies. The vessels, being without bottoms, stand in a cistern of water or other fluid about six inches deep, so that the gas cannot pass that way."

The drawings annexed are fac similes of those accompanying the specification. "In fig. 1 there are nine vessels, four of which may work alternately. There is also a series of stop-cocks placed in some convenient situation to turn the gas through either set to the exclusion of the other. Suppose the cock 1, fig. 1, to be opened, which cannot be done without shutting cock 2, the gas then passes through the vessels, A, B, C, D, to the gasometers; and when a renewal of them becomes necessary, the cock 1 must be shut, and by being connected with 2, opens it at the same time, and the gas flows through E, F, G, H. K is an air-drain, through which the fireplace is supplied with air, and which is surrounded by a trench filled with water a few inches in depth, and of a sufficient size to allow of a purifying vessel being easily placed within it, so that the current of air may flow down through the vessel, the trench of water preventing the passage of air under the bottom edge. In the centre, L, stands a crane for lifting the vessels with their contents."

FIG. 1

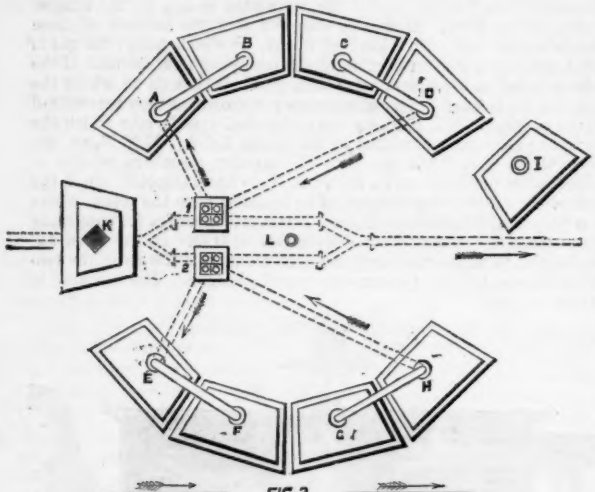
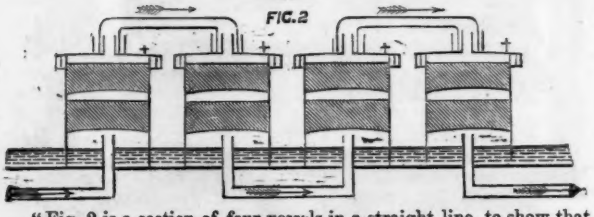


FIG. 2



"Fig. 2 is a section of four vessels in a straight line, to show that the gas passes upwards and downwards alternately, in the direction of the darts. The upper communicating-pipes are secured by water-joints, the under ones are firmly fixed. The lime mixture in the vessel that first receives the gas from the retorts will be the first which requires to be changed. The proper time may be ascertained by allowing a little gas to escape from a small cock inserted in each of the covers, and holding in the stream of gas a bit of paper wetted with acetate of lead, or any other test for sulphuretted hydrogen. For instance, if the test be slightly affected at the third vessel, the first may be removed, as it may be inferred to have done its utmost in purifying the gas. The renewal is effected by shutting the respective cock, and taking off the top pipes. A, the vessel containing the saturated lime mixture, is placed upon the air-drain. B is placed where A was, C where D, and D where C was. I, is a spare vessel charged with fresh lime mixture, and brought within reach of the crane upon a carriage, and placed where D was. The top pipes must be replaced, and the set is ready to work again. The current of air through A, soon clears it from its foulness, when it may be unpacked and charged with fresh lime mixture, and wheeled to the other side, to fill the vacancy occasioned by the next renewal."

This patent is specially referred to on account of the great merit it possesses, as it indicates in the clearest manner possible the method of employing the hydrate of lime as a purifying agent, it gives the first idea of deodorizing the foul material, and suggests for the first time the method of constructing the water-lutes for the covers of purifiers. The great error committed by the patentee was in forming the bottoms of the purifiers by a tank of water, which was regarded by Peckston as exceedingly dangerous, and prejudicial to this method of purifying.

In 1819 Uriah Haddock patented the process of purifying gas from ammonia "by passing it through water acidulated with sulphuric acid, or any other acidulated water capable of fixing the ammonia." Twenty years afterwards another patent was obtained, identical in purpose and in the means of its accomplishment to that described, which, although entirely devoid of novelty, was of a very lucrative nature.

(To be continued.)

Communicated Article.

GAS LIGHTING, SANITARY MATTERS, ETC., IN FRANCE.

(FROM OUR PARIS CORRESPONDENT.)

In the number of the JOURNAL for the 17th of February last (No. 562, vol. xxiii.), when speaking of the lighting by gas of the city of Bordeaux, we referred to the difficulty that would be experienced in finding a contractor for the new concession, to commence on the 1st of January, 1876. The mayor of Bordeaux having as yet been unable to come to terms with the Imperial Continental Gas Company, he has just announced a new adjudication, to take place on the 10th of November, the object being to settle the duration of the concession, which will be granted on the following conditions:—The new concessionaire will have to purchase from the existing company, at a valuation, all the lighting material, works, mains, branches, &c., at present in use, and fit up and fix at his own expense whatever new works, mains, or other apparatus may be necessary for the lighting of the city. At the expiration of the concession all the fixtures, mains, and working stock of every kind are to be handed over in good repair to the city, unconditionally and without indemnity. The price of gas supplied for public purposes and for the communal establishments is fixed at 5 centimes per cubic mètre, or at the rate of about 1s. 2d. per 1000 feet; for private lighting it is to be 22 centimes per cubic mètre, or about 5s. 2d. per 1000 feet, with a reduction of one centime every ten years. Is it possible the authorities of the city of Bordeaux can expect tenders to be sent in on such onerous conditions? We venture to predict that no contractor will think seriously of offering himself, and that, therefore, the lighting of Bordeaux will, as we have already said, remain in the hands of the Imperial Continental Company, on terms to be hereafter settled between the parties.

Pending the decision as to whether gas-meters are to be henceforth included among the number of legal instruments of measurement, each department has its own special legislation on the subject. By order of the Prefect of the Rhône, a competition has been opened in Lyons to afford the authorities an opportunity of selecting an improved form of gas-meter suitable for use by the three gas companies in that city during the triennial period from 1875 to 1877, and makers are invited to send in samples of meters for five and ten lights. The jurors comprise Government engineers, professors of physics, and managers of gas-works, and in addition to discharging the special duty for which they have been called together, they will have to decide the question of retaining or abandoning the 3-light meters, the use of which has been discontinued in Paris since 1866. They will also draw up a scale of charges for any repairs found to be necessary in the meters.

The prosecution of "patent gas" schemes does not appear to be confined exclusively to your side of the Channel. Here, in France, inventions promising extraordinary results have likewise made their appearance. One of these is the process of M. Martin, whose patent and working rights have been acquired by a company recently started in Paris, under the patronage of some of the most influential persons connected with the press of that city, and bearing the title of the "Compagnie Universelle d'Eclairage et de Chauffage." M. Martin's process has been under experiment for several months past in the small works at Noisy-le-Sec, in the environs of Paris, and, according to the company's prospectus, the following advantages are to be realized by its adoption:—

"1. The distillation of peat, wood, tan, or other ligneous substance, after having caused it to absorb, by immersion or compression, a prepared liquid hydrocarbon, on the proportion and character of which the quality of the gas obtained, whether rich or ordinary, will depend. Also the simultaneous production of a combustible available as an advantageous substitute for charcoal in domestic economy.

"2. The complete splitting up, by distillation, of the prepared liquid vegetable or mineral hydrocarbons absorbed by lump coke, producing at once a rich gas and a heavy metallurgic coke.

"3. The complete resolution, by distillation, of the prepared liquid vegetable and mineral hydrocarbons, absorbed by small coke and certain other combustible substances, into gas and tar, producing at once a rich gas and coke of ordinary quality.

"The absorption of the hydrocarbons is effected by simple immersion at temperatures always below 70° C. For peat and tan this rarely lasts more than 20 minutes, according to the density of these bodies. For wood it would be preferable to employ an injector; however, an immersion of several hours has given good results. For coke a few minutes only will suffice."

The results stated to have been obtained from the experiments conducted at Noisy-le-Sec are astonishing. We have not, ourselves, had an opportunity of verifying them, but we fail to discover anything new in these so-called processes and patents of M. Martin, which have been already tried in a variety of ways by nearly every gas engineer. They certainly do not appear to us to be destined to revolutionize the present method of manufacturing illuminating gas from coal.

At a recent sitting of the Academy of Sciences, a very interesting communication was received from M. Rosenstiehl upon the colouring matter of madder, which it is found may be produced artificially from the anthracene extracted from coal tar. Although the subject has for some considerable time engaged the attention of chemists, these rather complex colouring matters of variable composition are still but imperfectly understood, while their number has been greatly exaggerated. In his paper, M. Rosenstiehl establishes the fact that there are really in existence

only four substances clearly determined, and a mixture or combination constitutes all the other products which have hitherto taxed the patience and sagacity of chemists. These four substances are alizarine, purpurine, pseudo-purpurine, and hydrated purpurine; and even they may be reduced to two fundamental bodies—alizarine and pseudo-purpurine; purpurine and hydrated purpurine being only derivatives of the latter, which had for some time been erroneously considered as a product of the alteration of purpurine. In the course of a great number of experiments conducted in the works of MM. Thierry Mieg, of Mulhouse, M. Rosenstiehl has carefully studied the tinctorial properties of these four substances, and the effect produced by their combination in various proportions. The results have been such as to convince him that alizarine, which had hitherto been looked upon as the essential principle of madder, would be insufficient of itself to produce the effects obtained by the use of the natural article in its pure state.

M. Rosenstiehl has added to his memoir several important considerations, purely chemical, upon the general theory of the colouring properties of madder; and he shows that they are all derived directly one from the other, and differ only in the addition of a certain number of equivalents of oxygen. He then enters upon an entirely novel and interesting study of the composition of purpurine and other analogous colouring matters, to which we may probably have occasion again to refer.

M. Dusart has presented to the Academy a memoir on the antiseptic property of the heavy oil resulting from the distillation of coal. He has found that when this oil is added, in the proportion of from three to five parts in 1000, to a mixture of solid and liquid excreta, before putrefaction has commenced, their disagreeable odour quickly disappears; a very slight trace of ammonia, resulting from the decomposition of the urea, is perceptible, and this gives to the entire mass a faint odour somewhat resembling that of methylaniline. A mixture of this kind has been kept for twelve months without showing signs of putrefaction.

The two following experiments were conducted at the *mairie* of the eighth *arrondissement* in Paris:—

1. Two receptacles, each having a capacity of 22 imperial gallons, were selected for this experiment. In one case the heavy oil was added after the process of filling, which extended over a period of 15 days, had been completed. In the other the oil was placed in the empty receptacle, which was allowed to fill gradually, the process occupying the same time as in the preceding case. In both these trials putrefaction was completely arrested.

2. This was an experiment performed upon a cesspool having a capacity of about 130 cubic feet. At the time of the experiment it was about half full, and the contents were not to be removed for a year. The effluvium produced was most nauseating; ammonia was constantly given off. Into this receptacle a quantity of heavy oil, equal to about five pints for every cubic yard of capacity, was thrown. At the expiration of several days all trace of odour had disappeared, even that of the ammonia; in fact, the very existence of the cesspool might have been doubted. There was an entire absence of fermentation.

The warm weather we have had during the past few months has in no respect modified the conditions in existence anterior to the experiments. It, therefore, appears certain that the quantity of oil used may be reduced below the proportion of three parts in 1000, if, instead of operating upon excreta in a high state of putrefaction, care is taken to throw some of the oil into the cesspool immediately after it has been emptied.

This antiparasitic property of heavy oil, the commercial value of which is so very low, might certainly be turned to profitable account. In the researches upon the destruction of the *Phyllozera*, which occupy to so great an extent the minds of the most eminent men in the world of science and agriculture in France, we notice that various experiments have been made with heavy oil, with the ammoniacal liquor from gas-works, and also with the wet lime which had been used in the purifiers.

We must not omit to refer to a communication made to the Academy of Sciences by M. Fordos, on the deleterious action of the lead employed with tin as an alloy for the manufacture of vessels intended to hold or measure alimentary liquids. In the manufacture of pewter pots an alloy containing 10 per cent. of lead is usually employed, and, according to the experiments of M. Fordos, this lead is acted upon simultaneously with the tin, or even before the latter is affected, when the vessel is exposed to the atmosphere and to the action of acid liquids, such as wine, vinegar, lemonade, &c. The use of these alloys, therefore, whether in the manufacture of drinking vessels, or in the plating of the various utensils employed in culinary operations, may be attended with very serious consequences.

The observations we recently made on the subject of the impregnation of the subsoil of Paris by azotized products have been, to a certain extent, confirmed by the discovery of the existence of considerable quantities of saltpetre in various parts of the catacombs beneath the city. It appears that the authorities have decided on at once taking the necessary steps for working this important discovery for the benefit of the State gunpowder factories.

An extraordinary general meeting of the "Société Technique de l'Industrie du Gaz en France" will be held on Wednesday, Nov. 4, for the purpose of voting upon the applications for admission of new members. Any person desiring to join the society, and take part in its proceedings during the forthcoming year, is respectfully requested to forward his application at once to the secretary, at 21. Rue Abbatucci, Paris.

Correspondence.

STREET-LAMPS.

Sir,—Your readers will not fail to have noticed in your last issue the sketch and description of the American "Boulevard" lamp; and, believing in your desire to aid in the real improvement in street lighting, I venture to offer a few remarks thereon. I may state that I have carefully observed these lamps in actual use, and, as you correctly say, "the burners and regulators, it is true, are new in those put up, and, therefore, a full consumption is ensured;" the result of which, in carefully cleaned new lamps, ensures a cleaner and brighter appearance than that of old street lanterns, which may have done service for many years. But, singularly enough, we have no statement of the actual increase of light, as tested by photometric trial.

The special points of singularity in these lamps seem to me to be—1. The glass globe body; 2. The reflectors; 3. The question of repairs.

The general appearance is a mere question of taste only. Some persons may not admire the curious jar-shaped globe of glass, with its queer surroundings, while others may consider it extremely beautiful. On that point I do not venture to offer an opinion; I will endeavour only to consider this lamp from a practical point of view, thinking that a street-lamp is primarily intended to light the street.

1. *The glass globe body* may be new in shape and detail, but is scarcely new in theory. The old oil lamps had glass globes, and glass globe gas-lamps are now in use in Scotland. Glass globe bodies may often be seen in railway-station lamps, the only advantage seeming to be the absence of shadow thrown by angle bars and framework; yet in this "Boulevard" example, we find four supporting rods, thin, it is true, but then the angle bars of good square lamps are thin also, and could be made even thinner. In Dublin the lamps have only three metal angle bars, and the glass globes of the Scotch lamps are suspended by one rod, while a recently patented glass globe lamp, the "Excelsior," now to be seen in Euston Road, has no bars or rods whatever, but stands upon a small tripod base, and a square lamp, recently adopted by the Clerkenwell Vestry, has side, but no bottom bars, the side and bottom glass meeting edge to edge; but, however ingenious all these contrivances may be to avoid the shadows under or near the lamp, is that defect of serious importance? Is that the real defect of our street lighting? If not, then all this ingenuity and expense is simply thrown away, and we are as far as ever from getting the *increase of evenly diffused light*, which I venture to think is the real necessity.

2. *The Reflectors.*—Here, then, we have an attempt to gain increased lighting power. These are claimed, I see, as "one of the principal features of improvement," yet the term, reflector, is barely accurate, as the light intercepted by them is not reflected by a brilliant reflecting surface, but is *radiated* by a "porcelain enamel." There are two reflectors—of the lower one, it is hardly worth speaking, as its effect is confined to the space near around the lamp, where the light is already sufficient without its aid. Of the upper one, which has a more extended sphere of action, let any one draw lines on your sketch from the flame in the centre of the globe to the sectional margins of this reflector, and it will be found that it intercepts about 12 degrees of the arc between the vertical axis and the horizontal line, or 24 degrees out of 180 above the centre of the flame! And now what becomes of the light intercepted in these 12 degrees? Part will be absorbed or neutralized by the intercepting medium, and the glazed surface of the enamel will (while new and clean) act as a direct, but weak reflector; but the main part will be *radiated* through an arc of 180 degrees, nearly half of which will be practically lost by being again intercepted by the lamp itself and the lower reflector, and a large portion of the rest will radiate partly upwards above the level of the flame, and partly downwards to the ground close to the lamp; but the unfortunate *dark interval* between the lamps—the weakest point and the most serious defect of our street lighting—will benefit only by the small remainder. What the illuminating power of that remainder is, can easily be tested at various distances by the photometer; when that is done, and the result stated with authority, your readers will be in a better position to decide whether the gain is equivalent to its cost.

3. *Repairs.*—This part of the question is really so inconsiderable a part of the cost of street lighting (in England at all events), that it would not induce any careful local authority to change its lamps on that account alone—for instance, take the Bristol contract at £4 4s. per lamp per annum, of which it is stated only 17s. 6d. is for lighting, extinguishing, cleaning, repairs, and painting, and it is clear that only a few shillings can be the present cost of repairs.

In conclusion, permit me to express my satisfaction that street lighting is again receiving the attention it deserves; but if progress is to be made, then every novelty must be prepared to stand the test of full inquiry and free and fair discussion, in which, I think, we should keep constantly in view the fact that mere variation in the substance or form of the lantern itself is no real advance unless accompanied by a substantial increase of lighting power capable of standing the test of the photometer. Let us, then, aim at utility first, and leave the ornamental accessories to follow.

Light.

PELOUZE AND AUDOUIN'S LAST PATENT.

Sir,—Your edition of the 20th inst. contains a letter from M. Eugène Pelouze, explaining his system in answer to some inquiries. May I state that, for more than a year, I have been engaged in washing gas upon the principle of Rimmel's spray-producer?

I placed a tube in liquid, and blew gas over its orifice at right angles, first creating a vacuum for the liquid to ascend the tube in, and then spray when it came into contact with the gas blast.

I have followed this up steadily, and am in possession now of a perfect method of creating spray with a gas blast at a very low pressure indeed.

F. B. Heathorn, Captain (half pay), Royal Artillery, and a Director of the South Metropolitan Gas-Works.

5, Pall Mall, London, Oct. 26, 1874.

RELATIVE PRICE OF COMMERCIAL & CHARTERED GAS.

Sir,—"Justice" is represented as blindfolded; we now learn that, when spitefully disposed, she can be forgetful.

In my reply to "Justice," or rather, as I should call him, "Injustice," I dealt with that column of his figures which contained the *gist* of his comparison; the rest were more or less inaccurate, as I explained. Con-

fining ourselves to the standards in the relative Acts, and allowing for difference in burner, I must add to his column, in common justice, "Commercial Company, 3s. 9d. per 1000, 3·21 per candle."

Owing to "Justice's" short memory, he has omitted the above figures, which represent the state of supply by Commercial before the late advance in coals.

I can only repeat here that, having carefully read your report of the Commercial meeting, I see no company referred to by the chairman by name.

HENRY E. JONES.

Ratcliff Gas Company, New Crane, Wapping, E., Oct. 31, 1874.

EXHAUSTER REGULATORS.

SIR,—The author of the "Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas," No. 36, in your issue of the 27th inst., dismissed the bye-pass as an exhauster regulator very summarily, because it makes the exhauster perform unnecessary work, "by exhausting the same gas over and over again." Now, this may be so in the case of simple exhausters; but when the exhauster performs the duty of a washer as well, it is rather an advantage to have some of the gas passed through it again; and it is most decidedly a better and safer method than that of regulating the speed of the engine, which has frequently other work to do to suit the exhauster.

In several Scotch and English gas-works may be seen. "Whimster's Combined Gas Exhauster and Washer," described in the presidential address of Mr. Hislop at the meeting of the "North British Association of Gas Managers," on page 694 of the JOURNAL OF GAS LIGHTING for 1869, along with his Hydraulic Bye-pass Regulator, illustrated and described on page 847 of the JOURNAL for 1870, where the bye-pass, as a regulator, works admirably.

I thought it right to draw attention to this, as it seems to me a mischievous idea that the exhauster should always be altering the speed of the engine to suit itself. If it be such a strong objection that some of the gas should be twice passed through the exhauster, even where this is merely an exhauster, the bye-pass might be connected with the outlet of the scrubbers, and sufficient advantage would then be gained to compensate for the extra pumping done by the exhauster.

J. W.

Maryhill, near Glasgow, Oct. 31, 1874.

Legal Intelligence.

CAMBRIDGE BOROUGH SESSIONS.—SATURDAY, OCT. 24.

(*Before Mr.* BULWER, *Recorder.*)

THE ALLEGED EMBEZZLEMENT FROM THE CAMBRIDGE GAS COMPANY.

Peter Haslop and *Henry Charles Ingram*, late clerks in the employ of the Cambridge University and Town Gaslight Company, were charged with feloniously and fraudulently embezzling certain sums of money the property of the said company whilst being employed as clerks. The prisoners pleaded "Not guilty."

Mr. HORACE BROWNE appeared for the prosecution; Mr. COCKERELL (specially retained) and Mr. J. W. COOPER for the defence.

The case against *Peter Haslop* was first proceeded with.

The alleged defalcations were individually small in amount, and extended from 1872 to last summer. The principal witness was the manager of the company, at the close of whose evidence

The RECORDER said: I cannot say that there is no evidence to come before the jury, but where we have a case that must go one way, it is a waste of time to investigate it further. The charge against the defendant is that he embezzled this money. There cannot be any mistake about it. There is no doubt it was his duty, when he received the sum of money, to enter it or have it entered, in the cash-book. It is quite clear that these sums were not entered in the cash-book. So far he had neglected—I do not say feloniously—to carry out his duties, from inadvertence, or possibly from dishonesty. He might have done these things, but the prosecution were bound to go further, and to show that the gas company have not received this money. If all things had been done regularly and in order, that would have been the easiest possible thing to prove. As the learned counsel, Mr. Horace Browne, opened the case, all the money received on a particular day was entered in a particular book and put in the till. The money in the till, corresponding with the money in the book, was paid into the bank. If that was done immediately, and there was an empty till to start afresh, no possible mistake could have occurred; they must have known in a moment whether they were £5 short or not; but you find the amount appearing in the books was put into the till, say on the 8th of June, and remained there till the 12th of June, with the addition of all additional sums paid between the 8th and the 12th; but in the meantime, Mr. Wood might have had a baker's or a butcher's bill, and without dishonesty—it was convenient to him to ask Ingram to let him have £5, £10, or £20, and he gave an I O U, which he repaid when convenient. These irregularities going on, how is it possible for any one to say whether the gas company were defrauded or not? It fails to convince me that the case is made out that the gas company have been defrauded in one material point. It is quite possible for a gas company to make mistakes as regards entries; when the clerks see that the manager, whose duty it is to see that they do everything regularly, is committing these mistakes himself, surely it is not calculated to make them very observant in the discharge of their duties. If a man were inclined to neglect, he would have the strongest possible temptation. I am sorry to say this, without imputing anything wrong to Mr. Wood, except the impropriety of loose practice, which, if I were a shareholder or director, I should object to in the strongest possible manner as soon as it came to my knowledge. I do not mean to say that against Mr. Wood there is suspicion of dealing improperly. In the case which is now before you, I shall tell you that you are not to act upon suspicion, more especially in cases of embezzlement. In my judgment, it is a case which can only end one way, and I have to ask you whether, in your judgment, you think it necessary to proceed further—in fact, to find a verdict of acquittal.

The jury found a verdict of "Not guilty."

The RECORDER: The directors of the gas company could not have done otherwise than they have done in this case on the facts coming before them. They would have been acting very wrongly, and not been deserving of their position, if they had allowed this to go on.

Mr. HORACE BROWNE: After what has fallen from you, sir, I offer no evidence upon the other charges against Haslop, and in respect of Ingram also I offer no evidence.

The several charges forming the matter of indictment against Ingram were read over, and in each case the jury, by direction of the court, found a verdict of "Not guilty."

The RECORDER, addressing Haslop, said he had heard the case against him. It was always a matter of regret to see a man who had borne a good character for so many years in the position in which he now was. The jury thought that there was not a sufficient case to warrant a conviction, and he did hope that whatever excuse he might have had in the past, this case would act as a warning to him to be stricter in his accounts in any situation he might fill hereafter. That so large a sum of money as £5 should be received, and no account of it appear in the books, was most extraordinary. It might have been a mistake, and they were bound to hope it was; but if a mistake, it was one that, if repeated, might involve him in very serious trouble.

The defendants were both discharged.

CIVIL BILL COURT, DUBLIN.—FRIDAY, OCT. 23.

(*Before Sir* F. SHAW, *Bart.*)

GATCHELL *v.* CORPORATION OF DUBLIN.

ACTION FOR NEGLECT TO SUPPLY WATER.

Mr. J. A. CURRAN appeared for the plaintiff; Mr. J. O. BYRNE for the defendant.

This was an action by Mr. Gatchell, ironmonger, Henry Street, to recover a sum of £20, damages for neglecting to maintain a supply of water to his premises, as was required of and by the defendants, under the provisions of special Acts.

The plaintiff's case was that in 1871 the gas company's servants, while doing some work in Henry Street, injured the corporation sub-main to his (Mr. Gatchell's) establishment; that the corporation, in repairing the injury, cut off the water supply; and that in the interval they neglected to remedy matters. For three years (since 1871) taxes had been accepted from Mr. Gatchell less the amount of the water-rate; but a new collector having been appointed, he sued in the police court for three years arrears, £12 odd, and obtained a decree, the presiding magistrate remarking that Mr. Gatchell must take whatever steps he deemed most advisable to recover back the amount on account of the non-supply. The present action was in respect of that payment, and for neglect to supply the water.

The defence was that no complaint had been forwarded to their proper officers.

Having heard the case at considerable length, his lordship took this view of it, and "nilled" the plaintiff's civil bill.

GREENWICH POLICE COURT.—MONDAY, OCT. 26.

(*Before Mr.* PATTESON.)

HOUSEOWNERS LIABILITY TO WATER-RATES.

Mr. *Blow*, a builder, of Blackheath, appeared to a summons, charged with refusing to pay a sum of £6 15s. 6d., being the amount of rate charged by the Kent Water-Works Company for water supplied to the occupants of several small houses of which he is the owner.

The defendant disputed his liability, saying the rate ought to be paid by the occupiers, and that sufficient notice had not been given to him by the company so as to enable him to secure himself in the amount of rent paid.

Mr. HOLLAND, solicitor, who represented the company, pointed to sections in the company's Act of Parliament, obtained in 1864, conferring upon the company the right of charging the owners of property of a less value than £20 per year, whether let in tenements or not, with the cost of water, and also to the defined rate of charges to be made for such supply.

Mr. PATTESON made the order asked for, telling defendant he had the remedy in his own hands.

WEST RIDING POLICE COURT, BRADFORD—THURSDAY, OCT. 22.

(*Before Colonel* POLLARD *and other Magistrates.*)

ILLEGAL APPROPRIATION OF WATER.

Ambrose Dobson, a man in the employment of Mr. Balme, millowner, Stubden, was charged with damaging a conduit belonging to the Bradford Corporation by placing a "stank" in it.

The TOWN-CLERK (Mr. M'Gowen) appeared for the corporation.

It seemed from the evidence that not only had the "stank" been formed, but that water had been surreptitiously taken to supply Mr. Balme's mill. Mr. Balme formerly owned a mill which was supplied by a stream which the corporation took, but he was paid compensation for the loss of the water, and the corporation bought all the rights. He had since built another mill, near to which were three cottages belonging to Joseph Rushworth, the latter being supplied with water by the Corporation through a ¾-inch pipe, which would deliver 900 gallons of water in an hour, or nearly 20,000 gallons in 24 hours. No tap had been placed on the end of the pipe delivering water to the cottages, and the water had been allowed to run into a well, from whence it passed by a drain into Mr. Balme's mill-dam, a "stank" being made in the conduit to cause the water to flow through the pipe. It came out that the "stank" had been made by Hollings Dobson.

The case against Ambrose Dobson was dismissed, and Rushworth was held to to be responsible for allowing the water to run to waste.

The TOWN-CLERK only asked for one penalty, although water had been taken for years.

Rushworth was fined 20s. and costs, and the magistrates said they would inflict the full penalty on a repetition of the offence.

There was also a charge against Mr. *Balme* for taking the water, and Mr. Terry said that Mr. Balme was unaware of what was going on, as he had plenty of water; on which the town-clerk said he could prove that Mr. Balme had the drain for the purpose, and that water had been taken for 15 years without being paid for.

Mr. TERRY said that his client would allow the drain to be stopped up, and the case was then adjourned for a fortnight.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

CHELSEA.—COMMITTEE OF WORKS.—On Tuesday, Oct. 27, a meeting of the Committee of Works was held, to inquire into the Manchester and Paddington systems for the supply of gas to those places, and to ascertain how far either of them could be made applicable to the parish of Chelsea. Mr. Lahee read a letter from the London Gas Company, stating that they were not at the present time likely to lower the price of gas below 3s. 9d. per 1000 feet. A letter from The Gaslight and Coke Company stated that from the 1st of January next the price of gas would be reduced to 3s. 9d. per 1000 feet. Dr. Barclay said he had been in communication with the vestries of Paddington and St. Pancras, both of which boards employed their own men to light and extinguish the lamps, and they paid for the consumption of the gas as registered by meters, one of which was placed on every twelfth lamp in the district. The vestry would have to consider whether the price paid for the lighting of each lamp—20s. per annum—was excessive or not; whether they could curtail the hours of lighting; whether they could ascertain if they got the quality of gas for which they contracted, either by testing the burners or by going to the expense of fixing a meter to each twelfth lamp; and, finally, if the London Gas Company refuse to make any diminution of their charges, the vestry should take the lighting, &c., in their own hands. He added as his own opinion that the best course to be pursued would be, that during the next twelve months the governors should be tested from time to time, and that at the expiry of that period application should be made to the Paddington and St. Pancras Vestries for the result of their experience. If, however, the vestry should be of opinion that the wisest course was to follow the example of those vestries at once, they had a

complete code of rules drawn out by the gas referees, and furnished to the vestry of Paddington, which they should adopt in their entirety. On the motion of Mr. Sydney, the whole question of gas supply was referred to a sub-committee.

ST. GEORGE, HANOVER SQUARE.—Mr. Leslie has given notice, for the meeting of the vestry on Thursday next, "that he will call the attention of the vestry to the controversy in respect of the gas supply, commencing with his circular to the vestry, dated May 12, 1870. And he will prove to the vestry that every statement therein made, both as to law and fact, has proved correct. 1. The law, as stated in that circular, has been upheld by the unanimous decision of the Court of Queen's Bench, and, on appeal, by the Court of Exchequer Chamber. 2. The sulphur impurity then was 29·31 grains per 100 cubic feet of gas. The ammonia impurity allowed 5·0 grains per 100 cubic feet. 3. That in the present supply of gas the sulphur is reduced in each 100 cubic feet from 29·31 grains to 8·68 grains; and the ammonia in each 100 cubic feet from 5·0 grains to 0·02 grains. The present illuminating power of the common gas is stated by the Government officer to average 17·05 candles per 5 cubic feet of gas per hour. The Gaslight and Coke Company propose to reduce the cost of this gas (maintaining the above quoted purity and illuminating power) for the year 1875, including also their supply of cannel gas, 25 per cent., with the prospect of a further reduction from the discontinuance of the Westminster works and the Blackfriars works, by the sale of 8 acres of land, the capital arising from which sale will ease the consumers of gas supplied by The Gaslight and Coke Company of, *pro tanto*, 10 per cent., and go in further reduction below 3s. 9d. per 1000 feet of gas. The saving to the 8000 gas consumers of that company in the parish of St. George, Hanover Square, will be for the year equal to a 7d. rate. Mr. Leslie further states that the proposed reduction by The Gaslight and Coke Company will save the ratepayers of the City of London, in the year 1875, nearly £100,000. There are about 20,000 parties receiving gas. To obtain what is called an independent and competing supply of gas would require a probable outlay of £10,000,000 for the whole metropolis. Upwards of 1500 miles of roadways and footways in the metropolis would have to be broken up for a problematical cheaper and better supply of gas. It is now known that Parliament has never yet allowed a competing supply of gas, to which the rates were the origin of the capital, and the source from whence all loss and failure were to be made good. Mr. Leslie will move that the present and future prospects of reduction in the price of gas, as above set forth, induce this vestry, as representatives and trustees of so many thousands of their constituents thereby affected, to acquiesce in the proposals by The Gaslight and Coke Company, while, at the same time, it preserves the roadways and footways of the whole parish free for the comfort, traffic, trade, and commerce of their ratepayers from the ruinous effects of new gas-mains and house services."

QUALITY OF THE GAS SUPPLIED IN LONDON.—A contemporary, whose antagonism to the gas companies has been very marked during the last year or two, now writes: "We have been much interested in observing from the report of Dr. Letheby, the chief gas examiner, on the quality of the gas supplied by The Gaslight and Coke Company, the Imperial, and the South Metropolitan Gas Companies, during the last quarter, the high illuminating power which has been maintained. The common gas made at Beckton, North Woolwich, attained during the quarter a maximum point of slightly over 20-candle power, and the average lighting power of the gas in the whole three months was 18 candles. The standard which the Act of Parliament fixes is 16 candles. In the case of the Imperial and South Metropolitan Companies the same high quality is maintained. They are only required to give a lighting power of 14 candles; but we find that the Imperial Company attained at one place a maximum of over 20 candles, while at neither of the testing-places was the average less than 16 candles, and at one it was over 18. The South Metropolitan Company maintained the high average of 16¼ candles. Our readers know well enough that we are no apologists of the gas companies, and that we hold strongly that their position wants revising in many ways, especially in giving them more inducement to economical management, and to lessening the price of their commodity. While we lose no opportunity of expressing these opinions, and of advocating any measure which promises an improvement, we are bound, as fair and honest guides of public opinion, to give credit where it is due, and to show that the gas companies, governed by the Acts of 1868 and 1869, which Mr. John Leslie so much reprobates, are, at all events, now supplying gas of good quality to the public. How far this is due to the present agitation we cannot say." If our contemporary had studied the chief gas examiner's reports from their commencement, he would have found that the quality of the gas has been from the first maintained as it is now. Hence the present agitation has nothing whatever to do with the results above recorded.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the composition and quality of the metropolitan waters in October, 1874:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	17·33	0·048	0·115	0·002	13·7	3·3
West Middlesex	16·50	0·030	0·116	0·000	13·4	3·0
Southwark and Vauxhall	17·16	0·068	0·128	0·002	14·0	3·3
Chelsea	17·43	0·041	0·124	0·001	13·7	3·3
Lambeth	17·49	0·049	0·115	0·001	13·8	3·3
Other Companies.						
Kent	26·67	0·002	0·238	0·000	20·7	5·8
New River	17·29	0·015	0·114	0·000	13·4	3·0
East London	15·87	0·029	0·128	0·002	13·0	3·0

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, in those of the Grand Junction, Lambeth, and Southwark and Vauxhall Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Society of Medical Officers of Health, 120,871,501 gallons; and the number of houses supplied was 512,825. This is at the rate of 35·5 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 28·5 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne. HY. LETHEBY, M.B.

WINCHESTER WATER-WORKS.—An extraordinary meeting of the shareholders in this company was held on Thursday last to consider the question of selling the works to the Town Council and the Urban Sanitary Authority. The meeting, by 36 to 1, agreed to sell the concern at a price to be fixed by arbitration, on condition that the Town Council pay the cost of the arbitration, and also agree not to oppose a renewal of the company's Act, which the sale of a portion of their property would render necessary for carrying on the gas-works.

HALIFAX CORPORATION GAS-WORKS.

On Thursday, Oct. 22, a new railway siding, which connects the gas-works of the Halifax Corporation with the Halifax and Ovenden Railway, was formally opened in the presence of the members of the Gas Committee and a large number of visitors. The siding, which adjoins the Charlestown Road, is a fine structure, over 630 feet in length, and gives accommodation in the shoots below for about 10,000 tons of coal. Under the old system the coals have had to be carted from the station, the cost of which, and the attendant wear and tear of the roads, may be inferred from the fact that the quantity of coal consumed in the gas-works last year was 27,142 tons. Besides this the coal has had to be tumbled out of the trucks, loaded into carts, then shot up at the gas-works, and again loaded into trucks for conveyance to the retort-houses, and thus there has been a very large item of waste every year. The approach to the gas-works from the bottom of the town is very steep, and it is necessary to have three or four horses for each load of coals dragged into the yard. Hence, when the Ovenden line was projected, the desirability of having a siding into the works forced itself upon the minds of the Gas Committee. At the same time it was determined to enlarge the storeage-room for coal, so that the town might to a very great extent be relieved of anxiety in case of a coal panic like that of last year. The two works have been carried out together, Mr. Fraser, of Leeds, being the engineer for the railway portion, and Mr. Charnock, of Halifax, the contractor for the whole. The main siding leaves the Halifax and Ovenden railway by a junction at no great distance from the new goods warehouses at North Bridge, passing behind a new signal cabin, and straight into the sheds at the gas-works. In addition to this there is a loop siding for empty waggons to run upon on return; a siding for the repair of waggons, and a long siding, parallel to Charlestown Road, for waggons to stand upon until required. At the entrance to the sheds is a weighing-machine, so that each truck can be weighed as it enters the works, and a record taken of its contents. The extent of the sheds for storeage allow of a train of from 40 to 50 waggons being taken into the works at once. The rails are laid on timber beams, which are supported by strong iron beams, the ends of which rest on solid masonry. The sheds are 37 ft. 6 in. wide, increased in some places by 12 or 15 feet by the erection of wooden sheds, and the depth from the platform is about 22 feet. When a truck of coal is shunted in here it will be only necessary to knock out the cotters of the doors in the bottoms of the waggons, and the whole contents will fall into the stores below, until the stock rises to the level of the metals. At the end of the sheds nearest the retort-houses there are 22 store bunks, all constructed on the hopper principle. Each of these hoppers is lined with sheet iron, and the coal placed in them will run down into a funnel, and be let out as required, by means of a wheel slide, into trucks for conveyance to the retorts, so that a very small proportion of the coal used will require lifting by hand after it leaves the collieries. The railway locomotives can run the whole length of the sheds, and at the terminus very strong buffers have been erected, to prevent the waggons running too far. The whole scheme is well devised, and has been carried out in an excellent manner by Mr. Charnock. At the opening of the siding, a train consisting of an engine and six waggons was run into it, the coals were promptly discharged into the shoots, and the train immediately left again. The whole process, including the weighing of the waggons, lasted only 13 minutes—and from that circumstance may be inferred the great saving both of time and labour, and consequently of money also, which has been effected by the construction of this siding.

At the conclusion of the ceremony, Alderman Berry, chairman of the Gas Committee, entertained a select number of guests at a banquet in the town-hall. After the usual loyal toasts, the CHAIRMAN proposed the health of the mayor (Alderman Wayman), which was heartily responded to.

The MAYOR, in acknowledging the compliment paid to him, remarked that during the last two years the corporation had passed through very strange times indeed. They had had to sacrifice, for one year at least, £3000 or £4000, consequent on the reduction in the price of gas from 4s. to 3s. 8d. Materials of all kinds had risen considerably in value, and they had also had to pay largely increased wages, so that it was utterly impossible to make a rate of 3s. 6d. or 4s. do more than a rate of 2s. 6d. did half a dozen years ago. Independently of this, they had had to contend with the awful calamity of a great fire, arising from the explosion of gas at Messrs. Lister's mills, which had placed them in the unfortunate dilemma of having to meet the damage sustained in consequence of that fire; but that was a disaster for which no reasonable man would say the Halifax Corporation was at all responsible.

After the health of the mayor elect (Mr. E. Crossley) had been drunk,

The MAYOR proposed the health of the engineers, and expressed regret that Mr. Fraser was unable to be present. He spoke very highly of Mr. Fraser's engineering skill as exhibited in Halifax, and particularly in the new North Bridge. He also spoke in terms of eulogy of Mr. Cooper, the resident engineer; and, in a passing reference to the borough engineer (Mr. Escott), said that gentleman had fulfilled the highest expectations of the council, and the general opinion was that he was the right man in the right place.

Mr. COOPER, the resident engineer, in responding, said he had heard Mr. Fraser say that day that he had never received greater kindness from any corporation than that of Halifax. As to the present work, the labours of the engineer had been materially lightened through the interest shown in the work by the chairman of the Gas Committee. The new siding took a traffic of 30,000 tons a year from the streets, and in that respect alone it would be a success.

The health of Mr. Charnock, the contractor, and of the superintendents of the railways, of the colliery owners, the town-clerk, and others followed.

The MAYOR then proposed the toast of the evening—the health of Alderman Berry, chairman of the Gas Committee. During the many years Mr. Berry had been the chairman he had been supported by the committee with the most hearty unanimity and goodwill. He was satisfied Mr. Berry had saved to the town many thousands of pounds by his foresight and sagacity.

The toast having been drunk amid much enthusiasm, and with musical honours,

Alderman BERRY, who had a very hearty reception, returned his cordial thanks to the company, and especially to the Gas Committee and its various sub-committees—and to nobody more than to Alderman Thomas, chairman of the Extension Committee—for the untiring zeal with which they had worked. That very day, he remarked, the Bradford Corporation were buying coal unriddled from the Park Coal Company to tide them over certain strikes, but the Halifax Corporation had no fear now of being in such difficulties.

The health of Alderman Thomas having been drunk,

Mr. DYSON proposed the health of Mr. Malam, the gas engineer and manager, and Mr. MALAM, in responding, quoted the following figures to show the remarkable expansion of the Gas Committee's business:—

	1864.	1873.
Coals used	14,883 tons 18 cwt.	27,142 tons.
Cost of coal	£6905 2s. 6d.	£12,202 5s. 7d.
Cost per 1000 feet in coal	12·87d.	18·24d.
Price per ton at works	9s. 3½d.	14s. 2d.
Profit on capital, per cent.	£7 18s. 4d.	£8 13s. 6d.
Leakage	17·92	9·74
Gross profit	£9000	£17,000

Other toasts followed, and altogether a very pleasant evening was spent.

FOREIGN AND COLONIAL GAS COMPANY, LIMITED.—A petition to wind up this company has been presented to the Court of Chancery, and will be heard on the 7th inst.

HILLS'S IMPROVEMENTS IN THE PURIFICATION OF GAS AND GAS LIQUOR.

The accompanying drawing represents, in vertical section, an apparatus for pumping gas liquor, in accordance with an invention patented this year by Mr. Frank Clarke Hills, of Deptford. As the invention is one of great interest and importance to gas companies, we shall describe it at some length by the aid of the specification filed last month at the Patent Office.

This invention relates to a process described in the specification of letters patent granted to Mr. Hills, on the 25th of April, 1868 (No. 1369), by which process gas liquor was to a certain extent freed from sulphuretted hydrogen carbonic acid, and other impurities, and when thus purified was used for purifying gas. According to that process the gas liquor was boiled in one of a series of stills, and the ammoniacal vapour thus driven off was passed through the other stills, into which cold crude gas liquor was run. This liquor took up the ammonia, and the ammoniacal liquor thus obtained was used in scrubbers for the purification of gas.

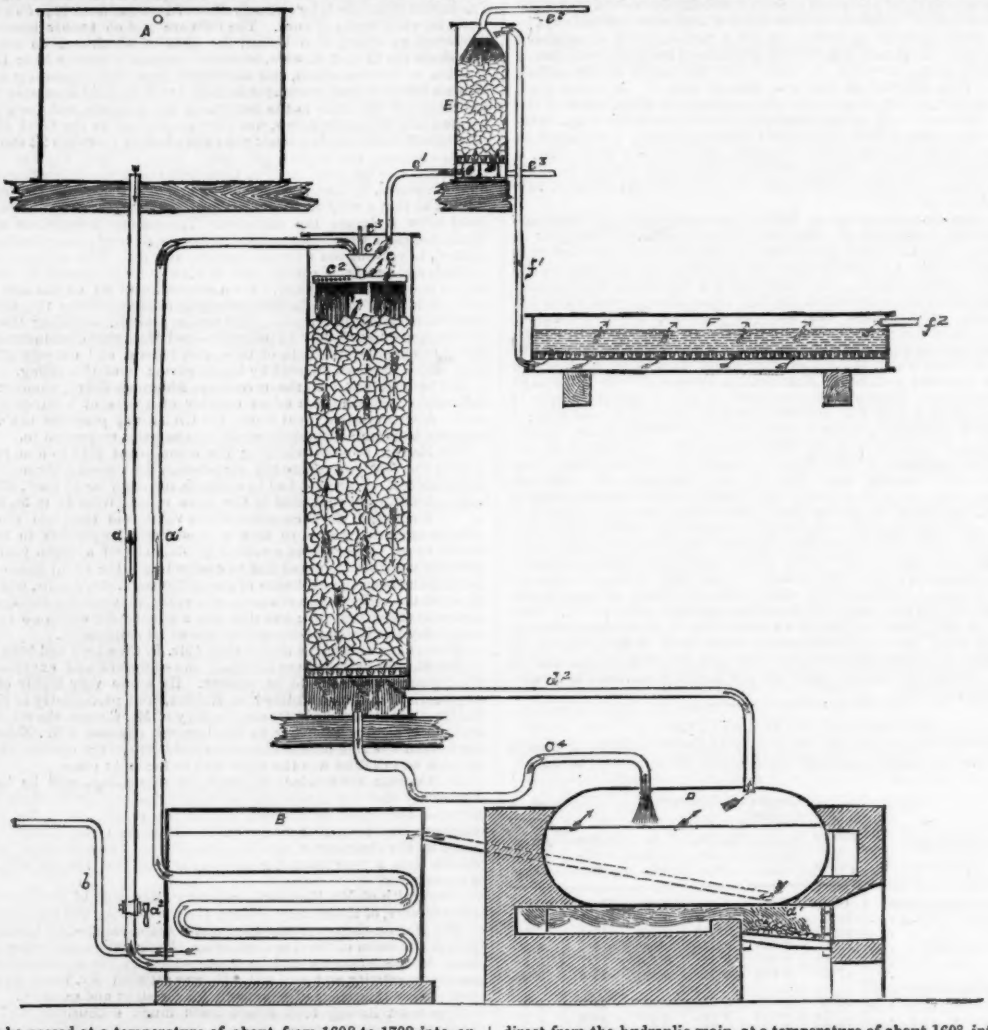
The present invention consists of the improvements hereinafter described, principally in purifying gas liquor for the purification of gas, and the method of proceeding is as follows:—For the series of stills employed under the previous patent a single still or vessel is substituted, and this still is connected by a pipe to a scrubber, through which the crude gas liquor to be purified is run on its way thereto, and, instead of boiling the gas liquor, as described in the specification of the 1868 patent, it is merely heated to a temperature of about 180°, and caused to pass through the still at such a rate as to drive off the greater part of the carbonic acid and sulphuretted hydrogen which it contained, together with some ammonia. These products pass from the still to the scrubber, which they enter at the lower part in the usual way. They then pass up through the coke or other medium through which the crude gas liquor is run on its way to the still. The gas liquor, as it meets the ascending gases, condenses the greater part of the ammonia, which runs back into the still with the gas liquor, while the sulphuretted hydrogen and carbonic acid gases escape at the upper part of the scrubber with a little ammonia. The latter may be taken up by water, preferably warm, in a scrubber or washer, or by acid, or other suitable agent.

Instead of running the hot gas liquor to be purified through the scrubber into the still, as already described, it may be run in a regulated stream direct into the still, on to the surface of the hot purified gas liquor. In this case most of the gases contained in the fresh liquor will be driven off, but with more ammonia than if the liquor were run through the scrubber before entering the still. The gases driven off are then passed through a scrubber or condenser, or through acids, or other agents to prevent the ammonia from escaping with them.

The still may be heated by steam or by fire, and furnished with diaphragms, as described in the patent of 1868, with reference to the boiler, E, so that the crude gas liquor may be run in at one end of the still and through the several compartments thereof to the other end, whence the gas liquor runs out purified.

The gas liquor to be purified is run into the still in a regulated stream, and flows out purified, as stated; and the hot purified gas liquor is made to heat the cold gas liquor in any convenient way, but preferably by means of a heater. The gas liquor so heated is run into the upper part of the scrubber, through which the gases driven off pass to condense and combine with the ammonia carried over with the gases. The carbonic acid and sulphuretted hydrogen may be passed through oxide of iron, by which means the sulphur of the sulphuretted hydrogen may be retained, the carbonic acid escaping to the chimney through a pipe.

The crude gas liquor, after being heated by the hot purified gas liquor, as



described, may be passed at a temperature of about from 160° to 170° into an intermediate tank or vessel on its way to the still to be purified, or be raised therein to such temperature, and be passed through such vessel at such a rate as to allow it time to give off sulphuretted hydrogen. This may be utilized for making sulphide of lime, to purify gas from the more fixed sulphur compounds.

Instead of heating the crude gas liquor on its way to the scrubber by the hot purified gas liquor which runs out of the heater or still, the crude gas liquor may be run cold or lukewarm from the reservoir into the scrubber through which the gases are escaping from the still, and from thence into the still, the heater being dispensed with. But in this case it will take more fuel to drive off the gases, which will in a greater or less degree combine with the cold liquor and be taken again into the still, but there will be no escape of ammonia with the gases passing out of the scrubber, as it will be taken up by the cool gas liquor.

If the hot purified gas liquor from the still is not used to heat the cold gas liquor, it should be run into the gas condenser near the hydraulic main, so that it may there be cooled with the ordinary gas liquor which is there condensed, and the combined liquors may then be used to purify the gas in the gas scrubbers. Or cold purified gas liquor may be run into the condenser and used as above described. The gas liquor or ammoniacal liquor, treated as now described, may be used for purifying gas in scrubbers, or purifiers, or otherwise.

The invention consists further in causing ordinary gas liquor to combine with more of the carbonic acid combined with the gas, so as not to deprive the gas at this stage of so much sulphuretted hydrogen as usual, by passing it direct from the hydraulic main, at a temperature of about 160°, into a scrubber, through which, heated to about the same temperature, it is run. The sulphuretted hydrogen thus allowed to remain in the gas is useful for its after purification from its fixed sulphur compounds by combining with lime or ammonia.

In the drawing, A is the reservoir for containing the gas liquor to be purified, which liquor passes through a pipe, a^1, furnished with a stop-cock, a^2, to a scrubber, C. The pipe, a^1, passes through the heater, B, and is there surrounded by the hot purified gas liquor passing from the still, D, to the tank, as hereinafter described. In order the better to distribute the gas liquor over the coke or other medium in the scrubber, the liquor is passed into a funnel, c^1, affixed to a pipe, c^2, the opposite arms of which have perforations at opposite sides, so that as the liquor issues from the perforations, it causes the pipe and funnel, which are mounted on a spindle, c^3, to revolve after the manner of a Barker's mill. The liquor thus distributed descends through the scrubber and passes by the pipe, c^4, to the still, D, which is kept at a temperature of about 180° by means of the furnace, d^1. By this means the greater part of the carbonic acid and sulphuretted hydrogen, and part of the ammonia contained in the gas liquor, are driven off, and pass by the pipe, d^2, into the scrubber, C, where the greater part of the ammonia is condensed by the descending crude gas liquor, and passes therewith by the pipe, c^4, back to the still, D. The sulphuretted hydrogen and carbonic acid gases, with a little ammonia, pass through the pipe e^1 into a scrubber, E, which may contain either sawdust moistened with sulphuric or other suitable acid, or coke, through which water (preferably warm), either with or without a small per centage of sulphuric

or other suitable acid, is passed; such water enters by the pipe, e^2, and passes out by the pipe, e^3. The sulphuretted hydrogen and carbonic acid pass from the scrubber, E, by the pipe, f^1, to a tank, F, containing oxide of iron, which takes up the sulphur of the sulphuretted hydrogen, the carbonic acid escaping to the chimney by the pipe, f^2. The purified gas liquor passes by the pipe, d^3, from the still, D, into the heater, B, and thence by the exit-pipe, b, into a tank or reservoir.

By heating the gas liquor to a temperature of about 180°, as before described, instead of boiling it as described in the former patent, the process of purification is greatly simplified, and considerable saving is effected in the apparatus necessary for carrying it into effect, and in the fuel.

GAS LIGHTING IN LIVERPOOL.

[From the *Liverpool Albion.*]

It is a long time back now, but still one or two of the oldest inhabitants can recall the time when lighting by gas was unknown and unthought of. Some 60 years ago gas was first introduced into the metropolis, and of course Liverpool had its attention called to the new method of lighting. There was much dubiety as to the possibility of its success, but a trial was determined upon. The street-lamps were then fed with oil in open vessels. Our forefathers had not troubled themselves to pass out of what appeared to be the accepted groove of time, and the introduction of the new light was a startling revelation to those of them who were alive in 1812. They had been accustomed to darkness made visible in the centre of the town by means of the primitive lamps referred to, and to darkness absolute outside a very limited radius. The old lamps, it may be said, were fitted with double burners, made of loose linen yarn, fed with oil, and protected by a glass and tin environment, the whole being suspended from an iron arm affixed to a wooden pillar. They were far asunder, and anybody who was bound to go far in a dark night usually carried either a lantern or a torch to light the path. Towards the witching hour of the night these lamps were accustomed to pale their ineffectual light, and when the short hours came about they altogether forgot to enter any protest against the congenial darkness around.

It was to Mr. Sadler, the well-known and unfortunate aëronaut, that the people of Liverpool were indebted for the introduction of the new light. In 1812 Mr. Sadler was in Liverpool, and made an ascent from St. Domingo House, Everton, then a comparatively remote suburb, and called the attention of some prominent people to what was then called the "new light." A trial was resolved upon, and the neighbourhood of the town-hall was chosen as the most suitable for the experiment. Accordingly, in the beginning of the year 1816, two gas-lamps, with three burners each, and fed by suitable appliances, were placed in Castle Street, and these lamps remained until a very recent period, when they were replaced by others more in accordance with the advanced spirit of the times. After this a lamp was lighted in Dale Street, opposite the Saracen's Head. People were enraptured with the new light. Standing beneath the old lamps, they had been scarcely able to tell the time on the dials of the broad-faced watches of the period; but now they could see how time progressed even when distant from the gaslight. The old lamps were "nowhere," and it was voted that the single gas-lamp in Dale Street gave more light than all the others in the street. Shortly after this a company was formed for the purpose of lighting the whole town with gas, with more especial relation to the docks. To carry the project into effect an Act was obtained in the 58th year of the reign of George III. (May, 1815), empowering the company to light the parish and borough (which were then co-extensive) with gas. The company was entitled the Liverpool Coal Gas Company. Mr. W. W. Sadler was appointed the engineer of the company, and for the site of their works they purchased land and buildings then known as Wyke's Court, in Dale Street, now occupied by the police court buildings, the fire police buildings, &c. The Coal Gas Company erected works there, and afterwards removed them to Newington, whence, the site being required for the Central Railway Company, they removed to Duke Street, where the offices of the existing company now are. Mr. Sadler continued manager of the company until a period shortly precedent to his death, in 1824, an event which was caused by an accident on his ascent in a balloon from Bolton on the 29th of September of that year. The car caught a chimney when nearing Blackburn, and he was thrown out, receiving such severe injuries that he died in a short time afterwards. He was succeeded by Mr. William King, uncle, and subsequently by Mr. Alfred King, father of Mr. King, gas engineer to the now existing company.

In the meantime, however, a prejudice had existed and had not been overcome to the use of coal gas in private houses. It was considered suitable enough for street illumination, but people generally could not be brought to believe that it was equally well suited for lighting their houses. So in 1823 an "Oil Gas Company" was established, the object of which was to furnish a purer gas than it was supposed could be manufactured from coal for private use. The oil gas was, however, found to be costly in the extreme, the price charged at one time being 45s. per 1000 feet, or exactly ten times the price now charged by the Liverpool Gaslight Company for gas supplied in the suburbs. People and companies, however, went on amicably together in those days. In 1834 the Oil Gas Company obtained an Act of Parliament, empowering them to make gas from coal, and in 1848 an Act was passed for the amalgamation of the two companies under the title of the Liverpool United Gaslight Company.

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

(*Continued from page 573.*)

The CHAIRMAN said the next paper on the programme was on "Retort Setting," by Mr. Henry Walker, Saltcoats.

In the unavoidable absence of Mr. Walker, the SECRETARY (Mr. Dunlop) read the following letter:—

Dear Sir,—At the present time I do not see my way clear to attend the meeting on Thursday. In the event of my not being present, I would thank you very kindly to read the following few lines, which are in connexion with the plan I have sent for exhibition.

The plan of a setting of two retorts, which I have sent for exhibition, has not been proved by me; I therefore cannot speak on its merits. At the same time, I am quite of opinion that retorts set on the principle of my plan would give better results than that of the existing principle of setting one retort on each side of the furnace. The economy of space is one great object in the arrangement, and I have no doubt that higher heats, with a less consumption of fuel, could be more easily maintained, and the cost of their erection much less than that of the present system of setting two retorts. The plan being in every way complete will be easily understood.—I am, gentlemen, your most obedient servant,

HENRY WALKER.

Gas-Works, Saltcoats, Oct 5, 1874.

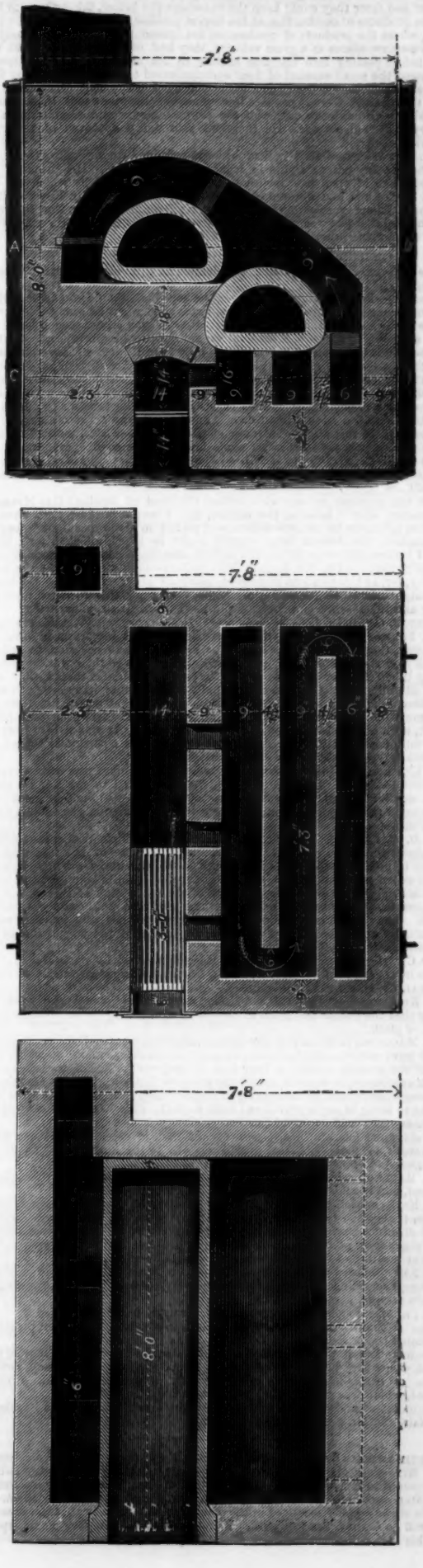
The CHAIRMAN reminded the meeting that, after the business was over, the members were to visit Mr. Scott's gas-works for the purpose of seeing his new system of working retorts.

Mr. SCOTT: It will yet take a considerable time before these retorts are brought to perfection, but I am thoroughly convinced that the process is the best I have seen for carbonizing coal.

An illustrative diagram of Mr. Walker's system of setting retorts having been handed round the meeting, a short discussion followed.

Mr. KEY said that Mr. Walker's idea almost encroached on his (the speaker's) patent rights. He, however, condemned the plan of traversing shown on the diagram, and he believed that the heat would be better economized where the pillars were crosswise instead of longitudinal.

WALKER'S PLAN OF SETTING TWO RETORTS.



Mr. YOUNG observed that where they wanted the heat to be equally diffused, and to take full advantage of the heating powers of the fuel, he thought the opener and freer they could keep the chambers the better, taking care to draw off the products of combustion at the lowest possible points. By the flue principle, where the products of combustion are caused to pass through comparatively narrow spaces at a great velocity, they had not time to part with their heat before passing into the flue leading to the chimney; and the speaker instanced the small amount of heat communicated to a cannon in being fired, where the intensely heated gases were discharged before they had time to part with their heat. Were it possible to confine, or otherwise cause these gases to pass slowly through the orifice of the cannon, they would communicate to it a very high temperature. He therefore thoroughly approved of the open-chamber principle.

Mr. KEY remarked that he had hitherto refrained from alluding to the fact that he had any patent rights in regard to retort-ovens. His principal was entirely that of open ovens, with a certain arrangement by which the heat could be checked and diffused equally, so as to save fuel. Mr. Key concluded by quoting a communication in the JOURNAL from Mr. Thomas Newbigging, in which special notice was taken of the system of Messrs. Scott and Young, which superseded many others, his own included.

SCREW PITCH OF IRON GAS-TUBING.

The SECRETARY next read a communication on this subject from Mr. Macleod (Glasgow) as follows:—

Dear Sir,—I send you the following in the hope that, should you agree with me in considering the matter of pressing importance, it might be brought under the notice of the association's meeting, with a view to such an expression being sent forth as should tend to the removal of an undoubted grievance, and which affects the gas manager in a less degree only than it does a kindred branch—viz., the gas-fitter. I refer to the question of *screw pitch* of iron gas-tubing as manufactured by our *Scotch* tube-makers. The English makers have adopted—with great advantage to all concerned—a *uniform* pitch for the several sizes; but for some reason, or rather no reason, our Scotch tube-makers seem one and all to follow a pitch of their own. Thus, one manufactures a certain size of pipe with 10 threads to the inch; another the same size, with 11 threads; while a third, in order to stir the confusion to the point of exasperation, produces a cross betwixt the two. I need scarcely add that a want of system like this is a continual inconvenience, a source of much trouble and unnecessary loss of time.

I do not presume to say what action the West of Scotland Gas Managers Association should take in the matter, but I would suggest that, were the question taken up by the association, and placed in its proper light before the tube-makers, the desired improvement might be speedily looked for. Moreover, I believe that were the Scotch makers adopting a common standard—say, similar to that used by the English tube-makers—they would not be the losers thereby, for, as things stand at present, many an order goes across the border that might as well be given out at home, saving for this unwise diversity of screw and the absence of a common pitch.—I am, dear sir, yours truly,

Glasgow, Oct. 6, 1874. WM. MACLEOD.

Mr. YOUNG said this was a matter of very great importance. Just the other day, the firm with which he was connected had occasion to order a quantity of malleable iron piping, to make extensions to their works; and not having taken the precaution to specify the particular pitch of thread, they were annoyed to find that it did not correspond with what they had already in other departments of their works. The consequence was that where junctions had to be made, new threads had to be put on, whereas, had there been one uniform thread, such inconvenience could not have occurred. It was a pity that this uniformity could not be secured, for, once committed to a particular thread, one is comparatively at the mercy of one particular maker.

Mr. KEY concurred in thinking that some rearrangement was necessary, and suggested that the Scotch tubing should be assimilated to the English make, which was Whitworth pitch. As an association they could not do much; but he proposed that they should at least forward a memorial on the subject to the Scotch makers.

Mr. D. B. PEEBLES (Edinburgh) was inclined to think that memorializing individuals would not have much effect, simply because of the taps and dies already in use; but when these were exhausted, advantage might be taken of the situation to recommend a gradual change. It would be a great improvement, not only if the pipes were made all of the same pitch of thread, but also if makers could be induced to adopt the same kind of couplings on wet and dry meters. The recommendation ought to be strongly urged, and pressure might be gradually applied in the way of stopping orders, if the suggestion of the association was not adopted.

The CHAIRMAN was afraid they might not succeed by memorializing the parties interested; but he suggested that the matter might be ventilated in the JOURNAL OF GAS LIGHTING.

Mr. KEY moved—"That this association memorialize the makers of tubes and meters that the unions and pitch of thread of iron tubing be assimilated to the standard pitch."

Mr. MACLEOD, in seconding the motion, observed that a body such as this would have considerable influence among tube-makers, many of whom were tired of the present system, as they had to keep up the Scotch threads to suit Scotch customers, in order to retain the trade in their own hands. He thought the association would be conferring a signal benefit on the trade were they helping to bring in an improvement such as that indicated, and the forwarding of a memorial would no doubt do some good.

Mr. JEFFREY (Kirkintilloch) pointed out that in cases where there was a large stock of pipes two sets would require to be kept, so as to fill up vacancies.

Mr. MACLEOD said that almost all the screwing tackle was manufactured in England, and it could easily be adapted to the standard.

Mr. Key's motion was then put to the meeting and unanimously adopted; and, on the motion of Mr. BROWN (Portobello), a vote of thanks was given to Mr. Macleod for having brought the subject under the notice of the association.

On the motion of Mr. KEY, seconded by Mr. DUNLOP, it was agreed to hold the next meeting of the association at Lanark.

Mr. KEY proposed that the rules of the association be revised, and that a clause be inserted excluding extraordinary members from voting in the election of office-bearers.

Mr. PEEBLES seconded the motion, which was unanimously agreed to.

Votes of thanks to the strangers present, and to Mr. Smith for presiding, terminated the proceedings.

The members of the association afterwards proceeded to Musselburgh Gas-Works, where they had an opportunity of inspecting Messrs. Scott and Young's system of carbonizing coal. The patentees fully explained the principle adopted, which was greatly admired by the visitors.

The members and friends dined together in the Royal Hotel—Mr. Peebles in the chair, and Mr. Smith acting as croupier.

NORTH SHIELDS WATER COMPANY.—A correspondent writing from Shields says: Next week Mr. T. Fenwick, C.E., of Leeds, and Mr. Hedley, of Sunderland, will proceed to make a valuation, on behalf of the North Shields Corporation, of the water-works of that town, with a view to the former purchasing them. But parties are so equally balanced in the council it is not likely that the proceedings will go beyond the valuation. The water-works company came upon a valuable feeder of water last week at the Billy Mill shaft.

ABERDEEN CORPORATION GAS SUPPLY.

At the Meeting of the Corporation of Aberdeen, on Wednesday, Oct. 28—the LORD PROVOST presiding—the gas accounts for the year ending Sept. 30 last were presented. The revenue and expenditure were as follows:—

Revenue and Expenditure.

Gas and meter rents.		£37,339	4	6	Manufacture of gas—		
Residual products—					Cannel coal	£24,803	18 5
Coke	824	4	1		Purifying materials	535	10 11
Tar & ammoniacal liquor	2,086	18	2½		Salaries of engineer and officers at works	459	0 0
Transfer fees	10	2	0		Wages of stokers and labourers	3,043	17 10
					Horse and stable account	224	10 11
					Maintenance of works and plant	1,692	12 11½
					Distribution of gas—		
					Wages of meter inspectors	462	17 7
					Repairing, renewing, and refixing meters	404	0 7
					Repair, maintenance, and renewal of main and service-pipes	381	13 2
					Rents, rates, and taxes	1,373	2 1
					Management	847	15 0
					Discounts on gas, & bad debts—		
					Discounts	632	3 10
					Bad debts	291	9 2½
					Amount transferred to depreciation, including £650 to contingent-fund	1,142	5 10
					Balance carried to meet annuities and interest	3,944	10 5½
		£40,260	8	9½		£40,260	8 9½

The total sum required for annuities and interest is £7000 12s. 10d., and the balance from last year, £2835 0s. 8½d., being added to the balance of the previous year, £3944 10s. 5½d., leaves a balance against next year of £221 1s. 8d. The revenue from all sources for 1874-5 is estimated at £43,690, and the expenditure at £43,646 1s. 8d., leaving an estimated surplus of £43 18s. 4d. In accordance with this estimate, the Gas Committee recommend the following rates and rents for 1874-5:—

1. The price of gas to all consumers, other than for the city public lamps, to be 5s. per 1000 cubic feet, subject to the following discounts on such accounts as are regularly settled half yearly in December and June:—

Where the annual consumpt is—

65,000 and under 100,000 cubic feet, discount 2d. per 1000 cubic feet.
100,000 ,, 1,000,000 ,, 4d. ,,
1,000,000 and upwards ,, 5d. ,,

2. The price of gas for the city public lamps to be 4s. 8d. per 1000 cubic feet without any discounts.

3. The rents for meters to be at the following rates:—

Size No. 0	1s. per annum.	Size No. 5	10s. per annum.
1	2s. ,,	6	15s. ,,
2	3s. ,,	7	20s. ,,
3	4s. ,,	8	25s. ,,
4	5s. ,,		

For less than 4000 cubic feet of gas consumed half yearly, the rent to be 1s. per annum for Nos. 0 and 1.

Baillie URQUHART moved the adoption of the report. He thought it must be very satisfactory to the members of the Town Council to find that the result at the close of the year had been so very near the estimates at the commencement. It had been estimated that there would be a surplus of £100, in place of which there was a small deficiency amounting to £221 1s. 8d. This had arisen from a variety of items, but the principal one was the large cost they had been put to recently in laying a very large main to the jute works. Last year they had been enabled to keep the gas at 5s. per 1000 feet, in consequence of the surplus brought from the previous year. This surplus, as had been anticipated, was now exhausted, and had the price of coals continued at the same high rate at which they were at the end of the former year, it would now have been necessary to increase the price of gas. They would observe from the estimates that had been made that the committee believed they were able to continue the price of gas at 5s., leaving a very small surplus at the end of the year. It did not appear that there was any anticipation of the price of coals rising for some time to come, and, consequently, it was to be hoped that the price of gas would continue at the present rate. It must be exceedingly gratifying that the price of the gas had been kept at such a low figure during a time that coals had been so exceptionally high—much higher than at any previous period—and also when the gas in other towns of similar size had been increased some 20 or 30 per cent. in price.

The DEAN of GUILD asked what was the necessity for having such a huge stock of cannel coal.

Baillie URQUHART, in reply, said that the members of the committee would bear him out when he said that he had at almost every meeting of the committee been pointing out this very particular point, and had been urging that there should be no more coals kept on hand than were really required. The baillie then proceeded to explain that there were four or five different kinds of cannel coal, and that they always required some of the best quality—that producing 33 to 34 candle gas. On one occasion, owing to a strike in the pits whence the best coal was obtained, they had been reduced to extremities, and, though they had managed to tide over that difficulty, Mr. Smith had insisted on keeping a rather larger stock than they had done during the past year or so.

Mr. MACDONALD said that the coal had been at the lowest rate they had been at for several years, and within 1s. of the minimum price.

The report was adopted.

CROMER GAS AND COKE COMPANY, LIMITED.—A company has just been formed to light the growing and attractive village of Cromer, Norfolk. At a recent meeting of the inhabitants, for the purpose of considering the propriety of introducing gas, Mr. Hedley, the engineer who had been consulted on the subject, estimated the cost of works sufficient for lighting the place and providing for any probable increase for some years, at £3000, and he proposed expending the further sum of £1000 for an outlay in gas-fittings to be lent on hire to the proprietors of lodging and boarding houses, hotels, &c. By doing this a very large and immediate consumption of gas would be secured. He proposed that the capital of the company should be £5000, in 1000 shares of £5 each. In the construction of the works there would be no unsightly shaft, and every means would be taken to prevent the slightest nuisance. The works would be constructed on the most approved principle. There would be no difficulty in finding the capital. He believed that Mr. Bower, St. Neots, would be glad to undertake the work, and, if necessary, find a large amount of capital.

KILBARCHAN GAS COMPANY.—The annual meeting of this company was held on Monday evening, the 26th ult.—Mr. James Baillie, chairman of the directors, presiding. From the balance-sheet submitted, it appeared that the total income of the company for the year had been £999 16s. 7d., and the expenditure £1153 4s. 6d.; excess of expenditure over income, £153 7s. 11d. It was explained, however, that £86 12s. 10d. of the deficit had been expended on permanent improvements, so that the actual deficiency amounted only to £66 15s. 1d. The amount in bank to the credit of the company is £194 0s. 11d., and it was stated that on the coal contracts for the year there would be a saving as compared with last year of at least £60; so that there would be no need to raise the price of gas further. It is at present 7s. 1d. per 1000 feet. On the motion of Mr. Miller, seconded by Mr. Shaw, the financial statement was approved. Mr. John Cochran was elected treasurer, and Mr. James Miller clerk to the company for the ensuing year.

BAHIA GAS COMPANY, LIMITED.

An Extraordinary General Meeting of the Shareholders of this Company was held at the Offices, Coleman Street, London, on Thursday, Oct. 28—CORNELIUS NICHOLSON, Esq., in the chair—"for the purpose of altering clause 21 in the company's Articles of Association, so that the ordinary general meetings of the company may, in future, be held in the months of May and November, instead of April and October; and for altering clause 28 in the said Articles of Association, so that the legal quorum of shareholders, constituting a meeting, may be eight instead of fifteen members."

The CHAIRMAN explained the reason why the directors sought the first alteration—viz., the difficulty of obtaining accounts from Bahia in time to prepare a balance-sheet for the meetings as hitherto held. With respect to the last half year's working, owing to the illness of Mr. Kilkeary and of his principal assistant, the usual statements for the months of May and June had not come to hand. The alteration would, he believed, make no practical difference to the shareholders, as the dividends would continue to be paid as before. He concluded by moving a formal resolution for carrying out the change in the articles in reference to the period for holding the half-yearly meetings.

Mr. LINGING seconded the motion, which, after some remarks by Mr. WILSON, was put and carried, with one dissentient.

The CHAIRMAN then moved a resolution to reduce the legal quorum of shareholders at the meetings from 15 to 8.

Mr. MAUDE suggested that the alteration as proposed would enable the directors, if so disposed, to make a quorum of their own members with the addition of two outside shareholders. Besides, he thought there ought to be an inducement to shareholders to attend the meetings.

The CHAIRMAN said he was entirely in the hands of the meetings. The directors only desired to facilitate business, and it was sometimes found difficult to comply with the Articles of Association as the quorum was at present constituted.

The motion was accordingly altered so as to require the presence of 13 members (including the directors), and in that form was passed unanimously.

At the close of the extraordinary meeting, a *pro formâ* ordinary meeting was held, and a resolution was carried adjourning the meeting until such time as the directors may appoint, due notice to be given to the members.

The CHAIRMAN said the necessity for the adjournment arose from the fact that the statements of account had not been received from Bahia. In answer to an inquiry, he said he did not think the accounts which had come to hand for the first four months of the year would justify any very sanguine expectations as to the results of the working of the half year, the price of coal having ruled very high. He believed the profits would enable the directors to pay the dividend on the preference shares, but what would be the position of the ordinary shareholders it was impossible to say until the whole of the accounts were to hand. He was glad to be in a position to state that the directors were now buying coal, for which they once paid 23s., at 14s. 6d., and that description for which at one time they paid 19s. at 11s. 6d. Freights were also 4s. a ton cheaper. This would make a difference of not less than £3000 a year, and £3000 represented 3 per cent. to the ordinary shareholders. Therefore, although perhaps the last half year's accounts might not be all that could be desired, those of the current half year, he believed, would prove more satisfactory.

The proceedings closed with a vote of thanks to the chairman.

SINGAPORE GAS COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held at the London Tavern, on Tuesday, Oct. 27—H. P. STEPHENSON, Esq., in the chair.

The SECRETARY (Mr. R. King) having read the notice convening the meeting, the following reports and statements of accounts were presented:—

The directors have the satisfaction of reporting continued progress in the lighting of Singapore, for particulars of which they refer to the report annexed, from their engineer and manager, Mr. E. J. Wells, dated Aug. 22, 1874.

The balance-sheet to June 30, 1874, and appended to this report, shows the financial position of the company. The directors have written off for depreciation of works and plant, and off the expenses of first establishment, as per balance-sheet, at the rate of 1 per cent. per annum for the present half year, and ½ per cent. per annum for the half year ending Dec. 31, 1870, making 1 per cent. for that half year. The profit for the half year, after writing off these sums, amounts to £1865 13s. 4d., which together with £62 4s. 2d., the unappropriated profit of the preceding half year, makes the available balance £1927 17s. 6d.; out of this sum the directors recommend the declaration of a dividend at the rate of 7½ per cent. per annum, less income-tax, on the amounts paid up on the preference and original capital, the balance of £77 4s. 9d. to be carried forward to the profit of the succeeding half year.

The dividend to be payable on the 20th of November.

REPORT OF ENGINEER AND MANAGER.

To H. P. Stephenson, Esq., Chairman, and the Directors of the Singapore Gas Company.
Gas-Works, Singapore, Aug. 22, 1874.

Gentlemen,—By the last mail (*viâ* Southampton) I had the honour to forward to you the complete set of balance-sheets, statements of accounts, banker's vouchers, &c., &c., showing the working for the half year ending June 30, 1874; they have all been prepared in the usual way, and, upon examination by the directors, I trust they will be found correct.

All the details being so fully shown in the accounts, it is not necessary for me to take up your time by going into figures. In the gas-rental there has been a steady increase, if we compare the working with the previous half year, the increase on the private gas rental (not including illuminations) has been 469·41 dols. Coke sales have not been so good as last half year. Tar and other products have improved, so that upon the whole the sales of residual products have been satisfactory.

Rates of exchange have been seriously adverse to the company for a long time past, and still continue so, 4/2½ on six months bank bills only being obtainable. Heavy losses are shown in this half year's accounts, both on remittances and on the payments for coals.

During the half year the only addition here to capital account has been the proportionate allowance for new services laid. Beyond the ordinary wear and tear expenses, no outlay has been incurred in the general works department. All the plant and machinery are in a state of efficiency, and the buildings are in good repair; No. 1 gasholder shows no signs of decay, and No. 2 is working satisfactorily.

The present process of purification still remains satisfactory, and is working well. Throughout the half year the full standard of illuminating power has been maintained, and the gas kept free from impurities.

The engineer's report will furnish you with all the particulars in this department as to details on coals, gas produced, &c., the loss or deficiency on the half year has been 12½ per cent. The arrears are slightly in excess of last half year, but upon the whole the collection of the rental, &c., has been satisfactory; as 32,206·71 dols. has been collected and paid to bank.

The fitters still continue to be fully employed, and there has been a steady increase in new houses and buildings fitted up; during the half year, increase in houses 46, lights 470.

The extension to Tanjong Pagar Road, mentioned in my last half-yearly report, could not be commenced with advantage, as our stock of lamps was run out, and the *Andromeda*, with mains and lamps, could not arrive before the end of this month. The *Western Chief*, with columns, will not be here until October. The work is now commenced, and will be carried on to completion as speedily as possible.

The directors, I am sure, will be glad to hear the arrangements for coals at present are satisfactory, and that we have stock sufficient to carry us well through next half year.

The *Don Ricardo*, carrying 433 tons of coal, was taken up in Australia to load at 20s. per ton freight; she arrived here at the end of last month, and her cargo has been stored in good condition.

At the end of May 113 tons of Bengal coal were received. Its working with Australian coal was satisfactory. If we can obtain low rates of freight we could draw a portion of our supplies from this source. The price of Bengal coal is 10·8 rupees, free on board, or equal to 21s. per ton.

A small sample of other coals from the Straits has been sent to me for testing, and it is stated there is a large quantity from where it was taken. This was tried in actual working, the results were quite satisfactory. I have engaged to take 150 to 200 tons as soon as it can be brought to Singapore.

The Japan and Formosa coals are very highly spoken of, but up to the present time I have had no opportunity of trying them. I have no doubt that the Sarawak coal will soon be in the market. As to whether it will be to the advantage of the company to use all Australian coal remains to be proved. The directors may rest assured that in this, as well as in all other matters, the interests of the company will be closely looked after.

In conclusion, I have to apologise for my lengthened report, and as the working and also the sale of products during July and the present month have been satisfactory, I trust that at the close of the present half year the profits will be satisfactory.—I have the honour to remain, gentlemen, your obedient servant,

E. J. WELLS, Manager

Balance-Sheet, June 30, 1874.

Dr.					*Cr.*			
Capital—					Cash at bankers		£1,135	17 4
£5 paid on 2000 preference shares	£10,000	0	0		Ditto in hands of secretary		2	18 1
£5 paid on 7829 ordinary shares	39,145	0	0		Bills receivable		200	0 0
£2 paid on 25 ordinary shares	50	0	0		Office furniture		134	14 6
£1 paid on 370 ordinary shares	370	0	0		Cost of works & plant, as per last statement	£32,955 9 10		
10,424 shares	£49,765	0	0		Add, extensions during the half year	284 13 6		
Debenture bonds	7,420	0	0			£33,240 3 4		
Sundry creditors	2,911	15	5		Depreciation at the rate of 1 per cent. per annum, for the present half year	£164 15 6		
Insurance reserve-fund	38	10	2		Depreciation at the rate of one-half per cent. per annum, for the half yr. ending Dec. 31, 1870	77 0 0		
Profit and loss	1,927	17	6			241 15 6	32,998	7 10
					Purchase of land		1,118	2 8
					Retort account		787	7 5
					Meter renewal account		171	16 0
					Stock on hand		10,941	8 1
					Amounts charged to capital for travelling expenses, rent, preliminary expenses, and interest on capital during construction	£10,840 5 11		
					Less amount previously written off	445 13 3		
						£10,394 12 8		
					Less amount written off during this half year, at the rate of 1 per cent. per annum	£54		
					Less amount written off for the half year ending Dec. 31, 1870, at the rate of one-half per cent. per annum	27		
						81 0 0	10,313	12 8
					Gas, meter-rental, fittings, and sundries under collection to June 1		1,610	11 0
					Gas, meter-rental, &c., for the month of June, and gas for public lamps for the half year		2,212	15 3
					Sundry debtors		251	5 0
					Travelling expenses, suspense account, and sundries		164	7 3
	£62,063	3	1				£62,063	3 1

Profit and Loss Account, from Jan. 1 to June 30, 1874.

Coal carbonized	£2,599	9	10		Balance at profit and loss, Dec 31, 1873		£1,806	18 0
Lime and oxide	18	2	3		Less amount declared as dividend, after deducting income-tax on ordinary and preference shares		1,744	13 10
Trade & general charges	534	2	8				£62	4 2
Rent, rates, and taxes	77	6	3		Gas and meter rental		5,272	18 4
Directors and auditors	205	5	0		Products, profit on fittings, and sundries		1,661	19 10
Salaries and collectors commission	577	10	10					
Wages	344	8	2					
Interest on loans and debentures	325	4	2					
Loss on exchange	131	17	2					
Bad debts and allowances	48	3	0					
Retort account	50	0	0					
Meter renewal account	30	0	0					
Depreciation on works and plant, & expenses of first establishment written off	322	15	6					
Office furniture	5	0	0					
Balance—profit for appropriation	1,927	17	6					
	£6,907	2	4				£6,907	2 4

The CHAIRMAN: Gentlemen, you will perceive from the reports, which I have now to ask you to receive, that we are able, on this occasion, to return to our 7½ per cent. dividend, and to write off our usual 1 per cent. for depreciation. In addition to that, we are able to write off one-half per cent. for a previous half year in which we were obliged to omit doing so. So that, considering we have gone through the coal crisis, and have been paying 6s. per ton more for coals in Australia than we did a year or so ago, considering also the very low rate of exchange which has existed at Singapore, and which is referred to in Mr. Wells's report—viz., 4s. 2d. and 4s. 2½d. per dollar—I think we may fairly congratulate ourselves upon the very satisfactory result of the half year's working. Comparing this half year with the corresponding half year in 1873, you will see that we have paid £262 more for coal, which is in a great measure owing to the loss on exchange, amounting to £112 more than on the previous occasion on this item. Mr. Wells's report refers to the loss on exchange, which altogether, in the half year, amounted to between £400 and £500, and this, to a small company like ours, is rather a serious matter. On the other hand, the gas-meter rental has increased £209, and the "Products and profits on fittings and sundries," £508, and these favourable items have enabled us to produce the results which I at first indicated to you. Of course our capital is somewhat increased, and is still increasing, on account of the extensions which we are carrying out. These extensions have not yet come into profitable rental; but we hope within three or four months we shall begin to receive a return on our outlay for the extension to the Tanjong Pagar dock. We expect to derive a profit, not only from the public lighting, but also from a considerable increase in the private rental, which we may anticipate to arise therefrom. With these few remarks, I will now move the adoption of the report.

Mr. COLLARD seconded the motion, which was put and carried.

The CHAIRMAN moved—"That a dividend be declared on the ordinary and preference shares at the rate of 7½ per cent. per annum, free of income-tax in both cases, on the amount paid up on the shares, from the respective dates of payment to June 30 last, and that such dividends be payable on the 24th of November."

Mr. NICOL seconded the motion, which was put and carried.

The Chairman then moved a vote of thanks to Mr. Wells, the company's manager and engineer at Singapore, for his able management of the company's business. He said Mr. Wells had lately become a municipal commissioner, and probably that would prove of advantage to the company. He was held in great respect by the consumers, and he had recently done good service to the company by placing shares at Singapore. It was always a great advantage in a foreign company to have shareholders among the consumers themselves, as it gave a local interest in the success of the concern.

The motion was duly seconded, and unanimously adopted.

A Shareholder proposed a vote of thanks to the chairman and directors, and to the local committee at Singapore, for their attention to the company's affairs.

Mr. Rice seconded the motion, which was carried unanimously.

The Chairman, in acknowledging the vote, said: On behalf of the directors and the local committee, I have to thank you for this renewed expression of confidence. We have not achieved what may be considered a great success in this company, but we have made steady progress, as you will see by the list of dividends paid since the commencement of the undertaking. We began in a small way, but seldom went back, though sometimes we made a little retrograde movement, to be recovered at a subsequent period. The company was formed in 1862, and we paid interest at the rate of 5 per cent., out of capital, until we opened the works. The first dividend we paid was in December, 1865, and I may tell you this, that we have paid our preference dividends throughout in full. For the first half year we paid our ordinary shareholders at the rate of 3 per cent. per annum, then 3½ per cent for two half years, then 3 per cent., then 4 per cent. for one year, 5 per cent. for one year, 7 per cent. for one year, then 6 per cent. and 7 per cent. for a half year each, then 7½ per cent. for a year, 7 per cent. for three half years, and now 7½ per cent. So that, although we have not been very flourishing, we have of late years been able to keep pretty near to 7 and 7½ per cent. I will say nothing for the future; we must leave the future to take care of itself; but you may depend upon it that we and our manager at Singapore will use our best endeavours to maintain the present satisfactory state of things. I may remind you too that we are somewhat writing off the capital of the company, and thus keeping it in a sound and wholesome state.

A cordial vote of thanks was given to the secretary, and

Mr. King acknowledged the compliment, expressing satisfaction at the slight increase of the dividend paid to the shareholders on the present occasion, and his hope that the future of the company would produce results equally satisfactory, if not better than they had been in the past.

AMERICAN WATER GAS RESEARCHES.

A Report by Professors Wurtz and Silliman.

[From the *American Gaslight Journal*.]

(*Continued from page 576.*)

III.

Recapitulation of all the Results on Boghead Coal.

(*a*.) By the hydrocarbon process—

Yield of gas per ton of coal by the average of four sets of experiments detailed above	25,565 cub. ft.
Illuminating power of 5 cubic feet, average of four sets of experiments	27·98 candles.
Total economical effect, in terms of spermaceti equal to 1 ton of coal, average of four sets of experiments	2,356·59 „

(*b*.) By the common method as already given—

Yield of gas per ton	13 619 cub. ft.
Illuminating power of 5 feet	26·45 candles.
Total economical effect, in terms of spermaceti equal 1 ton of coal	1,235·05 lbs.
Gain in gas by hydrocarbon process	10,946 cub. ft.
Per centage gain in gas	80·3 per cent.
Illuminating powers substantially identical.	
Gain in total economical effect, estimated in terms of spermaceti equal 1 ton of coal, equal	106·35 per cent.

Wollongong Cannel, Australia.

It may become a matter of interest to those living on the Pacific Coast of the United States to find an enriching material more available than the English cannels, which are necessarily very costly when laid down, for example, at San Francisco. In the Wollongong district, New South Wales, and under the Kembla Mountains, is a series of bituminous beds containing cannel coal, somewhat resembling the Boghead, but much less earthy, as will be seen by the analysis which follows, and amazingly rich in oil and gas. Associated is also a semi-elastic bitumen in a seam 18 inches in thickness, yielding about 60 gallons of crude oil to the ton by distillation. This important deposit is on the sea coast, only about 40 miles south of Sydney, and quite available to transportation.*

The following results have been obtained by us at the experimental works of the Manhattan Gaslight Company, in New York, by H. H. Hall, Esq., of Australia, and from whom the data given here were obtained.

Average yield (5 charges) of gas per ton	13,716 cub. ft.
Time of charges	30 minutes.
Coke (very light and lustrous)	424 lbs. per ton.
Illuminating power of 5 feet of gas burned in Scotch fishtail burner	13?·94 candles.
One bushel of lime purifies	5,686 cub. ft.
Gas from 1 ton equals sperm	6251·67 lbs.

Analysis of the Coal.

Volatile matter	82·5 per cent.
Fixed carbon	6·5 „
Ash	11·0 „
	100·0 per cent.

The gas was so rich that its candle power could be measured only by largely diluting it with common street gas.†

Even when 10 per cent. of the Wollongong cannel gas was added to 90 per cent. of street gas, whose illuminating power was 14·98 candles, it was found to be still too rich to burn in the 15-hole standard Argand. But it could be burned at the rate of 5 cubic feet in a Scotch tip fishtail burner, giving from the mixture an illuminating power of 26·54 candles. From these data the candle power of 1 cubic foot of the gas of this material is equal to 26·59 candles, a degree of illuminating power unexampled, so far as we are informed, in the records of gas-making from any material heretofore examined. This appears more clearly on comparing this result with some of the best known of the cannels of England and the United States thus:—

			1 Cub. Ft.= Candles.
Wollongong cannel	= lbs. sperm per ton	6251·26	26·54
Boghead cannel	= „ „	*1967·10	—
„ „	= „ „	†2755·6	10·38
„ „	= „ „	‡1235·0	5·29
Albert coal, N.B.	= „ „	§2511·57	9·85
Peytona cannel	= „ „	‖1440·0	8·4
Lesmahago cannel	= „ „	1529·0	8·77
Capeldrae cannel	= „ „	1670·0	10·01
Donisbristie	= „ „	1277·5	7·51
Wigan cannel	= „ „	627·4	3·04
Pelton Main (ckg.)	= „ „	532·0	3·12
Ramsay's Newcastle	= „ „	553·0	3·33
Westmoreland, Pa.	= „ „	§541·25	3·32

From these figures it appears that the illuminating power of the Wollongong cannel, whether estimated in pounds of sperm equal to one ton, or in the illuminating power of one cubic foot of the gas, is more than twice as great as Boghead by Dr. Fyfe's exceptional result, and ten times as great as the celebrated Wigan cannel.

The gas of this material loses 41·8 per cent. of its illuminating power, at 6° Fahr., a degree of condensation not greater than developed by the same low temperature in some of the results quoted in this report on common street gas. The limited quantity of this mineral at our command was insufficient to charge our hydrocarbon retorts; and moreover we had no means of collecting the gas in a separate smaller holder for examination; its extraordinary illuminating power entirely exceeding the capacity of the standard Argand, unless very largely diluted with common street gas. But from the general similarity of the material to the Boghead in its physical aspect (impurities excepted), we anticipate an increase of total economical effect by this treatment, fully equal, if not greatly superior, to that obtained from the famous Scotch mineral.

General Summary of Working Results.

During the four months when the Fair Haven works were under our direction, the results obtained are given in detail in Tables A, B, C, and D in the Appendix; but it is convenient to recapitulate them in the following condensed form:—

Table I.

Date.	Gas Made by Record of Meter.	Gas Made less Correction for Air.	Observed Candle Power.	Corrected Candle Power.	Yield per Pound by Meter.	Yield per Pound Air off.
Dec., 1863.	353,600	325,312	15·67	19·67	6·04	5·56
Jan., 1869.	182,910	164,610	15·32	20·32	6·67	6·0
Feb., 1869.	333,100	309,783	16·78	20·98	6·64	6·17
March, 1869	420,400	412,225	18·77	20·45	5·96	5·81
Total produce	1,290,000	1,211,930	..	..	..	..
Averages	..	..	16·63	20·35	6·33	5·88

Disregarding for the moment the particular kinds of enriching substances employed and their varying quantities (all of which are given in the details quoted) for the sake of a general comparison, we find the following results, viz.:—

Each ton of coal carbonized to produce the aggregate of 1,211,930 cubic feet of gas (corrected for atmospheric air from analysis) gave gas	13,171 cub. ft.
Having a candle power of	20·35 candles.
Giving pounds of sperm equal 1 ton of coal	913·80

The nearest term of comparison on an equally large scale of production which we have, is that offered by the results at the New Haven Gas-Works for 1868, where the average yield, with substantially the same coal, on a total make of 61,500,000 cubic feet, gave per pound of coal carbonized, 4·11 cubic feet of gas, of an average candle power of 18 candles.

Each ton of coal gave, therefore, gas	9206 cub. ft.
Average illuminating power	18 candles.
Equal to pounds of sperm for 1 ton	568

These figures offer us the following important comparison of the practical results of the ordinary process of gas-making with those obtained on a large scale, and with substantially the same coals, by the Gwynne-Harris hydrocarbon process, viz.:—

Gas produced by the hydrocarbon process from each ton of coal carbonized	13,097 cub.
Gas produced from same coals by ordinary process, per ton	9,206 „
Increase in the volume of gas made by the hydrocarbon process	3891 cub. ft.
Ratio of increase	42·26 per cent.
Candle power from the hydrocarbon gas	20·35 candles.
Candle power from the New Haven gas	18 „
Gain in candle power	2·35 candles.
Ratio of increase of illuminating power	13 per cent.

The total economical effect of the two methods is, however, more clearly seen by the following comparison, in which the value of a ton of coal is given in terms of the spermaceti required to produce an equal total illumination:—

Pounds of sperm equal to 1 ton of coal, on the average of 4 months, at Fair Haven, by the Gwynne-Harris hydrocarbon process	917·54 lbs.
Pounds of sperm equal to one ton of like coals carbonized at New Haven by common process, average of 12 months	568·00 „
Gain in total economical effect	449·54 lbs.
Per centage ratio of gain	60·88 per cent.

In this comparison, it will be observed, we have used the numbers from our tables, expressing the results after the application of the corrections due to atmospheric air found by analysis in the gas, and which, we conceive, express the truth. (See section on the effects of air on gas.) There may, however, be a doubt in some minds whether the gas is fully entitled to these corrections, which, it will be remembered, increase the candle power, but diminish the bulk of the gas recorded. We, therefore, subjoin another statement, in which the comparison is made upon the uncorrected record, thus—

* The only account we have seen of the geology of this region is that given by Prof. James D. Dana, in his "Report on the Geology of the Countries visited by Wilkes's United States Exploring Expedition," pp. 449, *et seq.*; accompanied by a map of the Illawarra coal-field, in which the Wollongong cannel exists. This remarkable mineral was discovered long subsequent to the date of Prof. Dana's explorations in 1840. The writer examined and analyzed the coals brought home by Prof. Dana from Australia, which analyses are published on page 476 of the report quoted. But among them there was nothing at all resembling the remarkable body now for the first time, as he believes, introduced to the knowledge of gas chemists.—B. S.

† Mr. Young, of Glasgow, well-known everywhere for his researches upon coal oils, of which industry he is a well known promoter, obtained the following results on the Wollongong cannel, by distillation for oil. The cannel yields per ton of crude oil, specific gravity 0·860 = 152 gallons, divided as follows:—

"Mineral turpentine" (light naphtha)	specific gravity	0·730 =	8 gallons.
Burning oil	„ „	0·815 =	72 „
Lubricating oil	„ „	0·890 =	33 „
Paraffin, 49 lbs.	„ „		5 „
Loss, ash, &c.	„ „		32 „
			152

Gas found by Mr. Young, 16,000 cubic feet per ton. (Communicated to B. S. by Mr. H. H. Hall, of Australia.)

* Advertisements of the proprietors.
† Dr. Fyfe.
‡ Manhattan Co., *loc. cit.*
‖ Our own results.

Gas produced by the hydrocarbon process from 1 ton of coal carbonized	13,940 cub. ft.
Gas produced from same coal by the ordinary process	9,206 „
Increase in the volume of gas made by hydrocarbon process	4,734 cub. ft.
Per centage ratio of increase in gas	51·42 per cent.
Candle power of the hydrocarbon gas, uncorrected for atmospheric air	16·63 candles.
Candle power of New Haven gas, same coals	18·00 „
Apparent loss in candle power	1·37 candles.
Per centage ratio of loss in candle power	8·26 per cent.

But the true relations of the two methods are best seen when we compare them by the total illuminating effects produced in pounds of sperm, as before, thus:—

Pounds of sperm equal to 1 ton of coal, on the average of 4 months, at Fair Haven, by hydrocarbon process	794·82 lbs.
Pounds of sperm equal to 1 ton of like coals, carbonized at New Haven by common process, average of 12 months	568·00 „
Gain in total economical effect	226·82 lbs.
Per centage ratio of total gain	39·93 per cent.

There are few gas engineers, we conceive, who would not be satisfied with a process which is capable of increasing their total gains by 40 per cent., with the use of ordinary caking coals, and with no costly changes in the apparatus. At the same time, in large works, properly conducted, we are persuaded that the results in practice may be brought up to the first of the two statements here presented.

Tabular Exhibit of Classified Results.

In Table II. is an orderly arrangement of the results detailed in the last two chapters, which offers to the eye a convenient mode of comparing the effects of the hydrocarbon process with the ordinary method of gas-making, as well as the relative value of the process upon various sorts of coals and admixtures.

Columns 11 and 12 afford, on the whole, the most satisfactory term of comparison, as they show the absolute gain by the Gwynne-Harris process in total economical effects, viz.—the product of the illuminating power into the volume of gas produced, a result from which there is no escape.

In columns 7 and 9 the numbers with an asterisk affixed show a *relative loss* in illuminating power, arising from the fact that the largely increased volume of gas produced has a less candle power *per cubic foot* than has the gas from the same coal carbonized by itself. But when the total economical effect is computed by calculating the illuminating power and the bulk of gas combined, the real gain is seen in its proper proportions. The Albert coal of New Brunswick is thus seen to be the only one of all the enriching materials employed on which there is an actual loss (2·9 per cent.). But between the Westmoreland coal, with 10 per cent. of Albertite added, and the same coal by ordinary process, with 5 per cent. of Albertite, there is seen to be a gain in total economical effect of 77·63 per cent., showing the high value of the Albertite coal when used only in small quantity in the hydrocarbon process. Were the value of the hydrocarbon process to be estimated by the increase of volume alone, the Albertite is seen by column 8 to gain 93 per cent.; while in the Peytona cannel the gain in volume is 124 per cent., and in the ratio of total economical effect is 24 per cent. To the manufacturer of gas, column 8 presents the results which are most likely to attract attention, as exhibiting the ratio of increase in the saleable commodity.

In order to preserve the convenient term of comparison offered by the use of the same materials on a large scale, by the two methods of gas-making, use has been made in column 2 of the yield per ton of Westmoreland coal obtained at the New Haven Gas-Works, in lines 3, 4, 5, and 6—viz., 9206 cubic feet, of 18-candle power, in place of 9500, the average which belongs to gas of 16-candle power, such as is made from the unenriched Westmoreland coal by the ordinary process.

Table II.

Name of Coal.	Cubic Feet per Ton.		Illuminating Power per Ton, in Sperm Candles.		Gain by the Gwynne-Harris Process.		Per Centage Gain by the Gwynne-Harris Process.		Total Economical Effect, stated in Pounds of Sperm to Ton of Coal.		Gwynne-Harris Process.	
	By Old Process.	By New Process.	By Old Process.	By New Process.	Gas in Cubic Feet.	Illuminating Power in Sperm Candles.	Quantity of Gas.	Illuminating Power.	Old Process.	New Process.	Gain in Economical Effect.	Per Centage Gain or Loss in Pounds of Sperm.
Westmoreland (alone)	9,500	14,057	16·62	16·65	4,557	·07*	48·73	·43*	541·257	797·634	256·377	40·79
Ditto and 5 per cent. resin.	9,206	12,454·4	18	19·67	3,248·4	1·67	35·28	9·27	568	840·20	272·20	47·92
Ditto „ 10 „ „	9,206	13,753	18	21·16	4,547	3·05	49·28	17·	568	997·8	429·8	75·49
Ditto „ 10 „ Albertite	9,206	14,201·6	18	20·72	4,995	2·72	54·32	15·66	568	1066·96	440·96	77·632
Average results uncorrected	9,206	13,798	18	16·63	4,592	1·37	49·88	8·26	568	786·745	200·75	38·51
Ditto corrected	9,206	13,171	18	20·35	3,865	2·35	41·99	13·	568	917·54	349·54	61·71
Blockhouse, N.S.	9,500	12,589	17·07	14·68	3,089	3·02*	31·46	21·25*	458·74	607·72	148·98	32·47
Ditto and 10 per cent. Albertite	9,500	12,656	17·07	15·75	3,156	1·32*	33·22	8·4*	513	683.42	170	33·22
Albert Coal, N.B.	14,784	28,672	49·56	24·79	13,868	24·77*	93·80	49·99*	2511·57	2436·95	74·62*	2·9*
Boghead	13,619	25,825	26·45	26·78	12,206	·33	90	1·24	1235·05	2549·56	1314·51	106·35
Peytona, West Va.	10,080	22,400	42	23·25	12,400	18·75*	124	47·10*	1440	1785·6	345·6	24
Wollongong Cannel	13,716	..	132·94	..	..	..	..	..	6251·26	..	..	..
1	2	3	4	5	6	7	8	9	10	11	12	13

Cost of Making Gas by the Gwynne-Harris Process.

From the data given in this report, any competent gas engineer can make his own estimates of cost. Every place has its own local rates for coal, labour, materials, gas, and incidental products, so that a carefully prepared estimate for New Haven or New York will be useful for Chicago or San Francisco only as a means of comparison.

There are, however, certain elements belonging to any calculation on this subject which it is well to consider, as also some questions which will occur to every engineer, respecting which it is best to offer such suggestions as experience and observation have brought to our notice, viz:—

1. We are satisfied that the best and most economical results in the use of this process will, in general, be obtained by setting the anthracite retorts in the same bench, or bed, with the bituminous coal retorts. Our reasons for this opinion are, that in this way no increased cost arises for fuel, or wear and tear of apparatus, and that the gases from the anthracite retort enter the bituminous retorts hot. It adds nothing, for example, to the cost of heating a bench of retorts, either of "threes," of "fives," or "sixes," whether or not one or more of them are charged with anthracite in place of bituminous coal. It is in full proof that, in the most economically constructed furnace, not over one-twentieth of the total calorific power of the fuel burned is applied to produce a useful effect.* It is plain, therefore, that there must be an important economy of fuel in setting the anthracite retorts in the same bench with the bituminous. We draw from these considerations the following very important practical conclusions, viz.:—

2. The fuel cost for the mixed hydrogen and carbonic oxide from the anthracite retort would be the same as that for ordinary bituminous coal gas, provided the volumes of the two gases produced by each retort were equal; but, inasmuch as the volume of gas from each anthracite retort is somewhat over 7000 cubic feet for 24 hours, while the gas from a like bituminous retort by the common process is not much over 4000 cubic feet, it follows that the fuel cost for the water gas is inversely as these numbers.† On the other hand, if the anthracite retorts were to be placed in a bench by themselves, a plan by no means without its advantages, the whole fuel cost and the stoking labour, as well as the wear and tear of the whole bench, becomes a proper charge against the water gas.

3. The actual consumption of anthracite coal in the anthracite retorts, burned in converting the superheated steam into mixed hydrogen and carbonic oxide gases, has been, during the four months trial at Fair Haven, on which our calculations are based, 10,284 lbs. on a make of 1,290,000 cubic feet; or, computed into the gas registered, it gives 7·97 lbs. for each 1000 feet of merchantable gas introduced into the holder.‡ Estimating the cost of anthracite at 8 dols. the ton of 2240 lbs., the cost of 1000 cubic feet of the perfected hydrocarbon gas will be about 3 cents. for the anthracite coal required to produce it, and *pro ratâ* for any other price of anthracite.

4. The cost of the steam introduced into the anthracite retorts need not amount to more than the interest and wear and tear on the boiler used to produce it, since in every gas-work of any magnitude the waste heat of the benches is most ample to supply all the steam required. But in case the steam is drawn from the boiler connected with the exhauster, the amount of coal or coke required to produce the additional steam is easily computed, on the basis that each 1000 cubic feet of steam consumed produces twice its own volume of mixed gases (assumed, for the purpose of this calculation, to be pure); therefore, if 7000 cubic feet of water gas are thrown off in 24 hours from an anthracite retort, one-half that bulk, or 3500 cubic feet, of steam is required, and to produce this volume of steam a little more than 2 cubic feet of water must be evaporated. Taking 8 lbs. as the amount of water evaporated by a pound of coke, it follows that to evaporate 125 lbs. of water (= 2 cubic feet) will require about 16 lbs. of fuel. Now, at Fair Haven, one of three retorts in a bench was an anthracite retort, producing rather more than 7000 cubic feet of water gas daily, and the amount of coke required to produce it was therefore about 16 lbs.

5. The labour involved in the management of the hydrocarbon process will be found to be less than is connected with the manipulation of the same number of benches on the common plan. This statement will doubtless excite surprise on the part of some, but the following facts warrant the opinion here expressed:—

Take, for example, a bench or bed of five clay retorts, each 9 feet long, the four lower retorts 14 by 22 inches each, and the fifth and upper one 15 by 28. To adapt this bench to the hydrocarbon process, the two retorts of the middle tier are fitted for anthracite and steam; the two lower ones are capable of burning off six charges of 224 lbs. (one-tenth of a ton each charge) daily, while the upper retort will receive 275 lbs. to 300 lbs. of Peytona or some other cannel. Let us suppose the two anthracite retorts charged with 600 lbs. of anthracite each, and, when fully heated—the whole bench being in the same condition—the two lower retorts receive their charges of 224 lbs. each of, say, Westmoreland coal. The hydrogen is now turned from both the anthracite retorts for two hours upon the distilling products of the two Westmoreland coal retorts. Just before the expiration of this time, the upper retort receives its charge of cannel, and the hydrogen is turned off from the Westmoreland upon the cannel for two hours. This completes the four hours round on the Westmoreland retorts, which are drawn, recharged, and the hydrogen, cut off from the cannel, is again restored to the Westmoreland retorts, while the cannel retort is waiting to be drawn and recharged in its turn.

The manufacturing returns of this operation will be as follows for 24 ours:—

Six charges of Westmoreland (two of 224 lbs. each)	2688 lbs.
Six charges of cannel, say 275 lbs. each.	1650 „
Total weight of coals carbonized	4338 lbs.
The Westmoreland alone, with the hydrogen, &c., produced 6·26 feet per lb., equal to	16,816 cub. ft.
The Peytona cannel produced by the hydrocarbon process 8 feet, equal to	13,200 „
Gas produced from one bench	30,016 cub. ft.

The candle power of this mixture will be by our experiments 14·68 + 20 ÷ 2 = 17·34 candles.

If Boghead cannel were to be used in the cannel retort, the product from 1650 lbs. would be about 25,000 feet per ton, say	18,900 cub. ft.
Giving a total product of	35,700 „
And an average candle power of	20 candles.
The coke from the Westmoreland coal is 40 bushels to the ton, and gives to the bench	48 bushels.
Coke required to fire the bench	36 „
	12 bushels.

The labour involved in this operation is as follows:—
In any well-ordered gas-work on the ordinary plan, four men in the retort-

* This estimate applies especially to steam-boiler furnaces, but is measurably true of all furnaces.

† We are well aware that many gas engineers claim a yield of 25,000 cubic feet of 15-candle gas in 24 hours from a bench of five clay retorts. This is a fair estimate for a new bench, but if the proper deductions be made for the gradual decline of power due to the accumulation of carbon, and the consequent loss of time in the working of the bench, arising from the necessity of burning out the accumulated deposit of carbon, it will be found that 20,000 cubic feet of gas per day is a fair statement of the actual working results from a bench of five clay retorts with ordinary caking coals.

‡ In April this quantity was 6·11 lbs. only, due to greater care in working.

house (four by day and four by night) will easily stoke five fires and take care of the charges.

In this operation two-fifths, or 40 per cent., of the labour of handling coal and coke is saved. If Peytona cannel is used, the coke will be saleable for domestic use, but will not keep up the heats of the benches. If Boghead is used its coke is worthless.

The anthracite retorts are charged on Sunday, and require attention but once a day during the week. We opened them usually at 7 a.m. daily, raked back the coal, and added 70 to 90 lbs. (see tables in Appendix) of fresh coal. It is probable it would be a better practice to draw the anthracite charge twice in the week, say 8 a.m. Sunday and 8 p.m. Wednesday; as it is observed that the water gas flows more freely when the charge is fresh. It is, however, important not to throw in the whole charge of anthracite at once, as 600 or 800 lbs. of cold coal is a severe test of the retort, and it is but little trouble to divide the charge into two or three parts with a two hours interval. The coal should be dry. It will readily be seen that the labour connected with the anthracite retorts is quite trifling, as compared with the five or six daily charges and drawings of bituminous coal retorts.

This statement may be summed up as follows, for a series of five benches for 24 hours:—

Five benches yield 30,016 × 5	150,080 cub. ft. gas.
Coal consumed 4338 × 5	21,690 lbs. coal.
Giving coke	240 bushels.
Consuming coke	180 „
Leaving surplus	60 bushels.
Anthracite coal required, say	130 lbs.
Labour required in the retort-house for 24 hours	8 men.
Labour required in the yard	1 man.
Lime for purification, say	40 bushels.
Administration and repairs	—

With these data the cost of the gas may be computed by each gas engineer for his only locality.

Nothing is said of the cost of steam. If it requires to be supplied by a boiler expressly heated for the purpose, it will use 350 lbs., or, say, 9 to 10 bushels of coke. But it is assumed that in all works of any magnitude the steam will be furnished by the waste heat of the benches.

(*To be continued.*)

NATURAL GAS IN THE CONEMAUGH VALLEY, PENNSYLVANIA, U.S.A.

During the past 10 years the attention of the writer has been frequently called to what is known as gas springs along the line of the Kiskiminetas and Conemangh River. These springs are found at various points along the aforesaid river, from Blairsville to its junction with the Allegheny near Freeport. At some points these springs are so strong as to throw water to a considerable distance above the stream, and produce a seething, rumbling sound, resembling the boiling of a vast cauldron many feet beneath the surface. Many years ago these gas fissures formed the principal barrier to the salt producer in drilling his wells, and many well-authenticated instances may be cited where the parties were compelled, on account of the strong flow of gas, which in some instances would throw water as high as the tops of the surrounding trees, to abandon half-drilled wells, and seek other locations for their enterprise. At that time it was thought that these deposits of gas were formed from the immense coal-beds which were known to exist in the surrounding hills, but latterly they are supposed to indicate deposits of petroleum many hundred feet beneath the surface; but, from whatever source they may come, we are now only interested in the fact that they do exist, and the great question is—can this unceasing stream of self-constituted bicarburetted hydrogen be made subservient to man's uses as a fuel, instead of coal, in the manufacture of the minerals with which the valley of the Conemangh so richly abounds. Only one test of this has so far been made. We refer to the one at Leechburg. At this place, some years ago, a company was formed for the purpose of testing their territory for oil; a well was drilled to the depth of 900 feet, when they struck a reservoir of gas so powerful as to render it impossible to prosecute the work any further. The company abandoned the well, but afterwards sold it to Messrs. Burchfield and Rogers, who own a rolling-mill at that place. They conveyed the gas in pipes from this well to their works, and are now running their mill entirely with gas instead of coal, at a saving to them of many thousands of dollars a year; and so satisfactory has the enterprise proved, that these gentlemen are now engaged in drilling a well at Apollo, with a view to getting gas with which to run their mills at that point.

So far, then, as gas wells are concerned, it has already been demonstrated that, as a matter of fuel alone, they will save to the manufacturer many thousands a year; besides this he gets rid of the dust, dirt, and smoke, which coal, as a fuel produces. He can also light his works at night with the gas from his well, and it is claimed can produce a much better quality of iron. The next question is—can this surface gas be so concentrated as to be useful to the manufacturer as fuel? Of this we have not as yet seen any practical tests, that is, we have not seen it gathered into reservoirs, and applied to heating furnaces, driving machinery, &c., but we are satisfied that it only requires a little skill and money to render it fully as useful and efficient as the gas procured by drilling wells.

A few days since, in company with several gentlemen, we visited the farm of Kier Bros. at Salina, on the West Penn Railroad, four miles west of Saltsburg, on which it was reported one of these springs was located. On arriving we found that one of the workmen on the farm had erected, over the fissure through which the gas escapes, a small clay oven, which formed a sort of reservoir in which the gas could collect. On the top of this oven was a small hole about the size of a straw, through which the gas could escape. On applying a lighted match to this hole we were surprised to see a flame of fire burst forth, strong enough, in our opinion, to run any ordinary sized manufacturing establishment. We lighted the gas about 9 o'clock a.m., left it burning, and returned about 3 p.m., when we found that instead of the fire having gone out, as some of our party predicted it would, it had increased materially through the influence of the heat, while the rocks in the immediate vicinity were so warm that we could not touch them with our hands. Messrs. Kier Brothers are now erecting a large fire-brick works on the farm, and will, most assuredly, test the value of this spring. Our opinion is that they will get from it gas enough to burn their brick, boil the salt from three wells near by, make steam for their motive power, and have enough left to light a town. The locality abounds in fire-clay, limestone, coal, and salt.

This is only one of very many farms along the line of this river which offer the advantages spoken of, and our object in writing this letter is to call the attention of our manufacturers to this important fact. This undeveloped source of wealth cannot lie uselessly hidden away much longer. Already the hand of progress grasps the key to unlock this vast treasure-house, and ere long we expect to see our beautiful valley lighted up with blazing forges, and hear it resounding with the unceasing clink, clink, of the sledge and hammer. —*Iron Age, from Pittsburgh Commercial.*

NAMES OF STREETS ON PUBLIC LAMPS.—The vestry of the parish of St. James and St. John, Clerkenwell, have determined that there shall be placed the street names on the lamps at each end, at the least, of the roads and streets of the parish, in embossed ruby letters, on glass ground at the back.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

As a matter of considerable interest to water-works authorities in various parts of the kingdom, I may mention that the indicating and registering meter arrangement introduced by Mr. Deacon, engineer to the Liverpool Corporation Water-Works, for the purpose of detecting wastes of water either from service or main pipes, is likely to be tried at Leeds. I am informed that an officer of that corporation has been sent to Liverpool in order to be initiated into the *modus operandi*, and that preliminary experiments and trials will shortly be made in several parts of Leeds, after having been inspected by certain of the Town Council committees. The results at Liverpool are said to be of a very favourable nature, the meter fully realizing all the expectations which had been formed of it by Mr. Deacon. There is little alteration in the general state of the iron trade since the date of my last report. Most of the foundry and engineering establishments are enjoying a tolerably full amount of activity on the various classes of work which have been detailed in these notes within the past few weeks.

Pig iron is a little lower, probably in sympathy with the decline in prices which has ruled in the Scotch pig iron market during the past week or two. Cleveland agents hold No. 1 foundry pig at 70s. to 71s.; No. 2 foundry, 67s. 6d. to 68s. 6d.; No. 3 foundry, 65s. to 66s.; No. 4 foundry, 61s. to 62s.; No. 4 forge, grey, 57s. to 58s.; No. 5 forge, mottled, 56s.; No. 6 forge, white, 54s. 6d.; refined metal, 79s.; Kentledge, 67s. 6d.; and cinder pig, 47s. 6d. per ton for net cash. Large lots can be negotiated at something under these figures, but not at any great reduction, owing to the fact that the Glasgow market is hardening again, there being a renewed firmness in the prices of special brands of Scotch pigs.

The coal trade throughout the South Yorkshire and North Derbyshire districts is in a state of encouraging activity so far as house coal is concerned, but the slack coal and engine fuel branch is very unsettled, owing to the absence of demand and consequent disorganization of prices. Generally speaking, the Sheffield demand for coal for manufacturing purposes is but light, so that quotations are very varied, ranging from 2s. to 5s. 6d. per ton. It should be borne in mind that another cause of the low prices in this department is the greatly increased competition brought about by the opening out of some 49 or 50 new collieries. Up to the time of writing I have not heard of any alteration in the price of coal, but some of the hard-washed coke producers have followed the lead initiated last month by a few firms in reducing the list price to 20s. per ton.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Moderate activity is still displayed at most of the mills and forges of the district, but the orders coming in are small and for immediate delivery. Buyers as a rule do not yet evince thorough confidence in the market, and still purchase very cautiously. In some few cases the smaller manufacturers have accepted lower rates than the standard quotations, but there appears no prospect of any further reduction being made by the leading firms for some months at least. Prices for branded iron remain unchanged on the basis of £11 per ton for marked bars. Ordinary sheets (singles) command from £12 to £13 per ton, and common rods, from £10 to £10 10s. Most of the works are in steady operation, though few of them have sufficient orders booked to keep them running for many weeks to come; however, the general tone of business is tolerably satisfactory, and the trade is not without features of encouragement.

There is still a steady demand for galvanized roofing sheets, and producers report themselves well employed. Around Dudley the makers of marine iron work are busier than they have been for some time past. Gas tubes and fittings are in much improved request, but the other branches of the wrought tube trade are still depressed.

The demand for pig iron continues fairly good, and prices are unaltered. All-mine hot-blast is from £5 5s. upwards, according to quality, and cold-blast from £6 10s. One or two more furnaces have been blown in during the past week, and there are now 74 furnaces in blast in the South Staffordshire district, against 94 this time last year. There is very little pig iron from other centres of production now coming into this district, and altogether the trade looks much healthier than it has done for some time past.

The ironfoundries are in well-sustained operation, and the demand for gas and water mains is brisk, the recent reduction of £1 per ton on heavy castings has given a wholesome stimulus to the trade.

The coal trade is without special feature, the demand is slowly improving, but prices are very irregular, and few contracts are being made. The labour disputes in Lancashire and the North, have to some extent influenced the market, but the demand is far from active, and prices are maintained with difficulty.

In the Cannock Chase district household coals now command attention, but the inquiries are not so numerous as is usual at this season of the year.

Coke is in improved demand, and prices are moderately firm, excepting for gas coke qualities, which are now in abundant supply.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The coal trade in the Manchester district, owing to the maintenance of the strike in West Lancashire, continues exceedingly brisk, and supplies are inadequate to meet the demand. For house coal especially the demand continues very heavy; for furnace coal the inquiry is also above the get, and all kinds of engine coal now find a ready market; the commonest descriptions, such as blend, which colliery proprietors had a short time since, in some cases, ceased to wind, in consequence of its unprofitableness, being now sold freely at good prices. Although the last prices in the Manchester market have not been altered, the selling prices at the pits are considerably stiffer, and range about as under:—Best house coal, 14s. to 15s.; common, about 12s. 6d.; burgy, 8s. 6d.; and slack, 6s. 6d. to 7s. per ton.

For gas coal and cannel there is still a very fair demand, but in the present state of the market many of the inquiries cannot be entertained. Of the best Wigan cannel there is none now in the market, and consumers who have contracts are being supplied out of stock. In the Manchester district, ordinary qualities of cannel are very firm, and quoted at about 22s. per ton at the pit mouth; unscreened gas coal fetches from 10s. to 11s.; and screened about 4s. per ton more.

There are many inquiries for the shipping trade, but very little business is being done in this direction beyond supplying old contracts.

The improvement in the coke trade, which I have previously noticed, is scarcely being maintained. Business during the past week has been rather dull; but prices have not been altered.

In the West Lancashire districts there is little alteration to notice. Notwithstanding various rumours which have been set afloat, none of the colliery proprietors have withdrawn their notices, and generally they maintain a very firm attitude. Those, however, who have continued at work have, in some cases, conceded even an advance in wages rather than stop their pits. Amongst the men a growing disposition to return to work is reported.

A firm tone continues in the iron trade of this district, and for immediate delivery orders are very difficult to place. No. 1 Middlesborough pig iron, delivered in the Manchester district, is quoted at 80s. per ton; No. 2, 78s. 6d.; No. 3, 74s. 9d.; No. 4 (foundry), 72s. 3d.; and No. 4 (forge), 67s. 3d. per ton.

In manufactured iron, bars and plates delivered are quoted at about £10 per ton; rails of heavy sections, £7 15s.; and light ditto, £8 15s. per ton. There are a large number of inquiries in the market from the Continent, for delivery next year, and the works throughout this district continue well supplied with orders for the present.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

As anticipated, the coal trade of the North of England was very quiet last week. The only active demand being for households for coasting purposes, and which fully sustained the advance of the previous week. They may be quoted at from 13s. to 16s. 6d. per ton, according to quality. The gas trade was not quite so stiff last week as the week before, and the prices ranged from 9s. 6d. per ton, the very lowest, to 13s., the best, with 2½ per cent. discount. Steam coals were not so much asked after, and this branch of the coal trade is weaker. Coals for mixing are sold at 25s. per chaldron, less 2½. A good quality of small coals may be had at 5s. per ton, and, notwithstanding the prices quoted above, they can hardly be called more than nominal. There is a good deal of irregular trading going on, and if there is not a fall in the price it is made up to buyers in larger discount. In the coasting shipping trade, handy vessels have been very much inquired for, and as there has not been more than an average number of vessels in port employed in the coasting business, a higher rate of freight has again had to be paid for handy sailing vessels; 7s. 3d. per ton was paid to London, and it may be fairly stated that all kinds of coasting freights advanced in value. At the same time, shipping business to the Mediterranean never was worse, and the outward coal trade to the Continent generally is very moderate in tone.

The iron trade of the North of England was firmer last week. The market at Middlesborough showed signs of improvement in the middle of the week, and there has been an improvement upon the rates there. Consumers have shown a stronger desire to buy for forward delivery. Business is satisfactory in several departments of the finished iron trade.

Business was only dull in the chemical trade of the Tyne last week. Soda-ash, from 48 to 52 per cent., was offering at 2d., less 5 dis.; bleaching powder, £9 10s., less 1 dis.; bicarbonate of soda, £14, less 2½ dis.; soda crystals, £4 10s., less 3 dis. The shipments, upon the whole, were satisfactory; and as stocks are low, makers continue to decline to enter upon contracts for next year at the present rates. The general business of Tyneside is extremely quiet at present.

The arbitration in the Durham coal trade in relation to wages is now before the umpire, Mr. Russell Gurney, Q.C., for his final decision. The Northumberland coal owners and the pitmen settled their dispute without going to arbitration. The men agreed to a reduction of 10 per cent.

REDUCTIONS IN THE PRICE OF GAS.—At Sevenoaks the price has been reduced from 6s. to 5s. 5d., and the Haddington, N.B., Company have announced a reduction from 8s. 4d. to 7s. 6d. per 1000.

ADVANCE IN THE PRICE OF WATER AT ILKESTON.—The directors of the Ilkeston Water-Works Company have informed their customers and the consumers of water generally that, owing to the great neglect and bad repair of many consumers taps causing great waste, together with the high price of engine slack and labour in general, they have resolved to advance the price of water supplied to cottage property. In future the price is to be 3s. per quarter upon the ordinary cottage property, and there is to be allowed 10 per cent. discount upon the quarter for payments in advance.

NOTTINGHAM CORPORATION GAS SUPPLY.—The following is a return of the gas consumed from Sept. 20 to Oct. 3, 1874:—

Nottingham	12,362,000	cubic feet.
Radford	2,416,000	,,
Basford	10,009,000	,,
Total	24,787,000	,,
Corresponding fortnight in 1873	22,601,000	,,
Increase, 1874	2,186,000	,,

Illuminating power, 17·50 candles.

PNEUMATIC GAS.—On Monday night the power-loom works of Messrs. Hally and Co., situate at Ruthven Vale, Auchterarder, were lighted, for the first time, with this new gas. Messrs. Laidlaw and Sons have constructed the necessary apparatus for supplying about 300 lights of the new gas. The whole arrangements appear to be exceedingly simple. A tank containing oil or gasoline is placed underground, at a depth of about two feet, and through this a current of common air is forced by mechanism, which requires little attention beyond being wound up like a clock twice or three times a week. From three to four gallons of gasoline will produce 1000 cubic feet of gas. As the cost ranges from 1s. to 1s. 6d. per gallon, this gas can be made at from 4s. to 5s. per 1000 feet. The cost of erecting the works for producing the gas will be about £260.—*Iron.*

ELGIN WATER SUPPLY.—The Town Council of Elgin having by a small majority expressed their intention to take over the water supply of the burgh, which is at present in the hands of a company, a public meeting was recently held, at which it was unanimously desired that a plebiscite should be taken. The Town Council, on the casting vote of the provost, who proposed the motion, and who is himself a director of the water company, agreed that voting papers should be issued to the ratepayers, asking them to return answers to the question whether they were willing that the town take over the water supply, and guarantee to the shareholders a perpetual dividend of 6 per cent., provided they should have the option at any time of purchasing the stock at £13 per share. On the votes being counted, the negative answers were 736, the affirmative 319—a majority of 417 against taking over the water supply on these terms.

VALIDITY OF GAS COMPANIES NOTICES.—At the St. Helen's County Court, on the 21st ult., Mr. Collier decided a case which affected the comprehensiveness of a notice issued by the gas company to certain consumers. The charge for gas is 4s. per 1000 cubic feet, and up to last Christmas a discount of 3d. per 1000 was allowed per quarter to consumers of upwards of a million feet annually. During the currency of the first quarter of the present year, a notice was received by the Greenbank Alkali Company that the discount would be allowed no more, and that the cessation would date from the previous Christmas. The gas company, who were the plaintiffs, believed their notice was retrospective, and the defendants held that it did not make the new rule operative until the beginning of the second quarter of this year. His honour decided that the notice was operative only from the moment of its receipt, and allowed the defendants the discount up to that date.

ASHTON-IN-MACKERFIELD GAS CONSUMERS COMPANY, LIMITED.—An extraordinary general meeting of the shareholders of this company is called for Thursday next—"To receive and consider and, if deemed expedient, to accept, with or without such modification as may be determined upon, an offer from the Ashton Local Board for the purchase of or to acquire or lease the company's gas-works, gasholder, purifiers, condensers, main and service-pipes, and gas plant, and for such period, at such price, and on such terms, or to be ascertained in such manner as therein mentioned; to authorize the directors or a committee to negotiate with the said local board for a sale or lease of the company's gas-works, gasholder, purifiers, main and service pipes, and gas plant, for such period, at such price, and on such terms, or to be ascertained in such manner as they may deem proper."

NEW YORK PUBLIC LIGHTING.—From a recent return of the Department of Public Works it appears that gas is furnished to the city of New York by the following companies, which divide annually between them a portion of the 700,000 dollars appropriated for lamps and gas:—

New York Gaslight Company	3011 lamps.
Manhattan Company	6542 ,,
Metropolitan Company	3425 ,,
Harlem Company	4055 ,,
New York Mutual Company	586 ,,
Westchester Company	1502 ,,
Suburban Company	901 ,,
Total number of lamps	20,022 lamps.

Register of New Patents.

766.—BECK, W. H., Cannon Street, London, "*Improvements in the manufacture of illuminating gas, and in apparatus employed therein.*" Patent dated March 2, 1874.

This invention has for its object the conversion into gas of the tarry, oily, and in some cases other liquid products resulting from the distillation of coal and other carbonaceous materials employed in the production of illuminating gas, and relates partly to improvements in processes and apparatus wherein such products are treated for conversion into gas, whilst associated with the permanent gas along with which they have been generated, and partly to improvements in processes and apparatus wherein they are converted into gas after having been condensed and separated from the permanent gas.

The first-mentioned improvements consist in the introduction into the ordinary carbonising retorts or ovens, heated to the ordinary gas-making temperature, of superheated or other steam, by preference above the charge and amongst the gases, tarry, oily, and other vapours, as they are generated. The mixture of gases, vapours, and steam is then conveyed into a decomposing retort charged with porous materials, such as coke, broken brick, or the like, and heated to a degree sufficient to effect the decomposition of the steam, and the chemical combination of its elements with the other vapours, so as to form a further volume of permanent gas additional to that derived direct from the carbonaceous material in the first retorts. The decomposing retort should be arranged with a false bottom, the coke or other porous material being placed thereon, and the gases, vapours, and steam admitted below so that they shall pass up through and amongst the heated matter before escaping from the decomposing retort. The steam may be generated in an ordinary steam-boiler, but it is preferred to generate it by causing water to drop by means of a syphon into a heated coil of pipe wherein it is first converted into steam and then superheated. By this means the quantity of steam entering the retort can be regulated more accurately than when supplied from a steam-boiler. The steam may, however, be decomposed by being passed over or through red-hot carbon or iron before its introduction into the carbonising retort.

The second-mentioned improvements consist—1. In charging into any suitable gas-making retort the tarry product to be decomposed, mixed with breeze or other porous material or with small coal. Steam, by preference superheated or previously decomposed by means of heated carbon or iron, is introduced into the retorts. The gases and vapours generated from the tarry products together with the steam then pass through a decomposer similar to that described in reference to the first-mentioned improvements. The chemical combination of the elements of the steam with the carbon of the tarry vapours is here effected, and permanent gas produced.

2. In causing the tarry or other liquid matter to be decomposed to fall, drop by drop, or in a fine stream, through a long vertical heated pipe or pipes, steam, superheated or not, or previously decomposed by the agency of heated carbon or iron being introduced therewith. The tarry or other liquid matter is vaporized during its descent, the vapours so produced mix with the steam or the products of its decomposition, and with it or them pass through a decomposer similar to that before mentioned, and for a like purpose. The vertical heated pipes are preferably of a conical form, and connected at their lower and wider ends with a retort or chamber in which any carbonaceous matter not vaporised or combined with the steam may be deposited and readily withdrawn when required.

3. In connexion with apparatus wherein tarry or other liquid matters are vaporized for subsequent conversion into gas, a residue of pitch remaining as in the process for which letters patent, No. 443, A.D. 1871, were granted to George Eveleigh. A vaporizing retort or pan, preferably set in an inclined position, is employed, the tarry or other liquid matter being allowed to enter at the upper end, flows down the heated inclined surface to the lower end, the volatile portions being vaporized during its passage. The pitch remaining overflows from the retort or pan by means of a syphon (maintained at a heat sufficient to keep the pitch melted) into a receptacle arranged to receive it. Heretofore it has been the practice to draw off this pitch periodically, the process occupying much time, besides being inconvenient and offensive. By the means referred to it is withdrawn as made, and without stopping the action of the apparatus. Steam, or the gases resulting from its decomposition, is or are by preference introduced into this vaporizing retort or pan, mixing with the tarry and other vapours. The mixture is subsequently passed through a decomposer similar to that before mentioned, in order to be converted into permanent gas.

4. In converting tarry or oily products into gas by injecting them in the form of spray or thin streams into a heated retort charged or not with heated porous material, by means of a jet or jets of the gases resulting from the previous decomposition of water by the action of heated carbon or iron, the hydrogen of the water combining in the heated retort with the carbon of the tarry or oily matters to form a permanent gas.

800.—FORBES, Rev. G. H., Broughton, Northampton, "*A new or improved compound for use as fuel or for the manufacture of gas for heating and illuminating purposes, capable also of being used in the production of a material suitable for the purification of gas.*" Patent dated March 4, 1874.

This invention refers to a combination of chalk or the refuse lime of gas-works, or its equivalent, with a mixture of common salt (chloride of sodium) and saltpetre (nitrate of potassa), or nitrate of soda, or its equivalent, or (instead of the above mixture) with common soda (carbonate of soda) or its equivalent, with or without tar or similar bituminous substance.

810.—WESTON, J. H., Lansdowne Road, Surrey, "*Improved means and apparatus for increasing the illuminating power of gas in lamps and other mediums of lighting, portable and otherwise.*" Patent dated March 5, 1874.

This apparatus is constructed so that the gas proceeding from the reservoir is led into the lower part of the lamp, which forms a chamber in which liquid hydrocarbon is contained. This chamber is divided into two partitions, one of which is subdivided (vertically) by perforated plates. These vertical divisions contain an absorbent material, which gets saturated by the liquid hydrocarbon, and the gas from the chamber proper passing through these, becomes purified before being led to the burner.

813.—GOOLD, G., Birmingham, "*Improvements in cocks or valves for regulating the flow of liquids.*" Patent dated March 5, 1874.

This invention consists of a tube having a cutting edge, and with a screw thread formed upon it with openings for the passage of liquid. Outside a collar formed upon the tube is an opening for discharge, and inside the tube is an annular collar forming a seat for a spherical valve, which is regulated by a

screwed stem working through a cap or cover fixed upon the outer end of the tube. The screwed stem has a handle at its outer end, or it may be fitted to receive a suitable key.

815.—HASELTINE, G., Southampton Buildings, London, "*Improvements in dry gas-meters.*" A communication. Patent dated March 5, 1874.

The object of this invention is to increase the working capacity of dry gas-meters to nearly double that heretofore afforded, and to make this increase of working capacity at comparatively trifling cost in material. These advantages are produced by the arrangement and combination of a plurality of moving discs instead of one as heretofore for each bellows.

As this invention relates more especially to the so-called "Glover meter," the improvements will be more readily understood by a brief reference to certain peculiarities in the construction and operation of the bellows. The "Glover meter" consists of a sheet metal case, the lower portion of which is divided into two like compartments by a vertical partition. Secured in each of these is a bellows consisting of one moving disc or diaphragm of tin plate provided with a ring which projects inward from its perimeter, and to which ring one side edge of a flexible leather band is secured; the opposite side edge being secured in like manner to another sheet-metal ring permanently soldered fast to the partition which divides the bellows portion of the meter into two compartments. The moving disc is supported upon the usual flagstaff so as to move inward and outward alternately from the pressure of the gas, and thus give motion to the flagstaff and its connecting valves and register. As the disc can move only through a prescribed space limited in its inward motion by the projecting ring on the partition, there is necessarily left a useless space equal in depth to the width of the said ring, and consequently the working capacity of the bellows is confined to the shallow space left between said ring and the flag-staff.

The present invention itself is not described apart from the drawings. The claim is for the employment in a dry gas-meter of a combination of two moving discs in each of the bellows either with or without a dividing partition. Also in the use of a fixed or stationary ring between the two moving discs, in combination with the open channel or port of the respective bellows through which the gas passes alternately into and out of the latter. In the combination of a bellows having two moving discs in each compartment, divided by a partition, with a single channel or port for the outside of the bellows, and a single channel or port for the inside of the same. In the combination of a plurality of bellows having two moving discs operating in respective apartments.

839.—WILLOUGHBY, J., Plymouth, SOUTHWELL, W. A., and BRIGGS, T. J., Palmerston Buildings, London, and WILLOUGHBY, S., Plymouth, "*Improvements in apparatus for distilling tar and the products thereof.*" Patent dated March 7, 1874.

This improved apparatus consists of a series of metallic pipes capable of bearing great pressure, arranged either as a coil or in any other suitable manner, and placed within the boiler which contains the tar or other substance. These pipes are connected with another series of pipes, which is placed in a furnace arranged exterior to the boiler. The pipes are filled with water, and kept perfectly closed during the operation of distillation; so that the water, which is raised to any desired temperature by means of the furnace, continually circulates through the pipes, thereby imparting the requisite degree of heat to the tar.

840.—COOK, H. W., Thurloe Square, Brompton, "*Improved apparatus for pumping or forcing water, air, gas, or other liquids or fluids.*" Patent dated March 7, 1874.

In this improved apparatus two moveable rotating pistons are mounted on separate shafts rotating round the same axis, and acting independently of each other. To each of these pistons an alternate fast and slow motion is communicated by external gearing, which is so proportioned and arranged that while one piston is passing rapidly round, say, 11-12ths of the circle, the other piston is either at rest or is slowly passing over the other twelfth part of the circle.

864.—WARNER, W. J., Gas-Works, South Shields, "*Improvements in the arrangement of gas-retorts and their appliances, together with apparatus and machinery for charging and discharging them.*" Provisional protection only obtained. Dated March 10, 1874.

This invention consists in building the retort-benches in a circle or segments of a circle, and arranging the retorts in sections of six and tiers of three or more or less, the furnaces for heating being fired from the outside. The retorts are by preference about 12 feet in length, and open at both ends. The retort-house is built in a circle also, and has a gallery running round it on the inside over the retort benches. On to this gallery the coals are elevated in trucks which are tipped or unloaded into a large hopper occupying the centre of the inner circle. The coal is thence drawn into a chamber beneath the hopper by an archimedian screw. From the chamber the coal falls into shoots depending from it into scoops made somewhat more than twice the length of the retorts. These scoops are mounted on a frame which extends from nearly one side of the inner circle to the other, and revolves upon an axis which is common to the frame, the shoot chamber, and the hopper. Attached to the frame is an engine for giving motion to the different parts of the apparatus.

The hopper being supplied with coal, the frame is brought opposite the retorts to be operated upon. The lids or doors are opened either by the engine acting upon a system of levers or by hydraulic power through the intervention of an accumulator. The scoops are driven into the retorts, and as they proceed the front halves force themselves under the coke of the previous charge and carry it forward and out. At the same time the rear end halves of the scoops are being filled with coal from the shoots. A continuation of this progressive movement will carry the coal into the retorts, and as soon as the scoops have entered a certain distance an arrangement is brought into action whereby the scoops are turned over, depositing the coke on the floor, or into a receptacle placed to receive it and the coal in the retorts, where, on the scoops being withdrawn and the lids closed, it is left to distil. The frame may then be moved to the next section, and the operation repeated.

873.—NEWTON, A. V., Chancery Lane, London, "*An improvement in pumps.*" A communication. Patent dated March 10, 1874.

This invention consists in a valve-box fitted to turn on or round its axis within the pump case or chamber and in an annular eccentric or other suitably-shaped passage in the chamber or case and round the valve-box, whereby in all positions of the pump a free communication is established with the under or inner side of the valve, while its upper or opposite side is closed to such communication.

897.—BAYLEY, H. D., and BAYLEY, G. H., Leek, Staffs, "*Improvements in the construction of taps or valves, which improvements are also applicable to the fixing of glass tubes in water-gauges.*" Patent dated March 12, 1874.

This invention is applicable to all kinds of taps or valves having a spindle passing out through a gland, such as taps or valves for steam, gas, water, or oil, water-gauges, tallow or oil cups, injectors, and spindle-valves of all descriptions. It is also applicable for fixing the glass tubes in water-gauges.

The object being to make the spindle steam, gas, or water tight without the use of packing, a double valve with two ground surfaces is employed—one working on the ordinary seat, and the other reversed and working against the seat in the gland through which the spindle passes, so that when the valve is opened the second or ground surface closes the joint between the gland and the valve spindle. The valve spindle is provided with a left-hand screw thread working in a similar thread tapped into a hollow spindle or neck passing outwards through the gland, and having a small hand-wheel or lever fitted on to its outer squared end. A portion of the valve spindle is squared, and it is prevented from turning by means of a screw or pin.

The hollow spindle or neck, provided with a conical shoulder, is ground to fit into the gland, through which passes a nut, screwed on to the outer end of the hollow spindle. This fixes the hand-wheel on to the square, and serves at the same time to keep the conical shoulders in close contact, so as to form a perfectly tight joint.

It will be evident that as this hollow screwed spindle or neck is turned round by the hand-wheel, the valve, being prevented from turning also, will be caused to move in a longitudinal direction by means of its externally screwed spindle working inside the hollow screwed spindle, and thus the valve will be opened or closed according to the direction in which the hand-wheel is turned, at the same time that the ground conical surfaces and neck entirely prevent any escape of water or other fluid.

907.—HUNTER, A. G., Flint, "*A new and improved apparatus for carburetting atmospheric air, and improvements in other apparatus connected therewith.*" Patent dated March 13, 1874.

The objects of this invention are, first, to cause a more perfect admixture or combination of the atmospheric air and hydrocarbon vapour than is obtainable by carburetting apparatus as hitherto constructed or in use; second, to prevent as much as possible atmospheric air so charged with hydrocarbon vapour when kept stored for any length of time from separating or diffusing itself into gases of different densities; third, to prevent the return or diffusion of the carburetted air from the carburetter into the air-supplying apparatus at times when the action of such apparatus is suspended; fourth, the invention relates to an improved air-supplying apparatus.

The improved carburetter, by which the two first objects of this invention are effected, consists in its simplest form of a horizontal box divided into compartments by transverse partitions. At the upper part of each of these partitions one or more openings are made, which may or may not be provided with tubes, whose lower ends terminate a short distance above the level of the hydrocarbon in the several compartments. The partitions may be formed of or coated with fibrous or porous material, and the sides, top, and bottom of the box may be also so coated; the tubes attached to the several partitions may or may not be filled or partially filled with fibrous material.

The atmospheric air to be charged with the vapour of the hydrocarbon is delivered into the first of the series of compartments, and by virtue of the smallness of the apertures through which it has to pass throughout the several partitions, from compartment to compartment, it is maintained for a long time in contact with the carburetting vapour or liquid in each compartment, and thus becomes highly carburetted. By means, too, of this construction of carburetter, the gases contained in it become immediately agitated at any time when the air-supplying apparatus is set in action, so that the gases which may have separated into portions of different density during the time the apparatus has been out of operation become agitated and rapidly readmixed.

The improved apparatus by which the return or diffusion of the carburetted air into the air-supplying apparatus is prevented, consists under one arrangement of a chamber furnished with inlet and outlet pipes, and containing a leather or other flexible top carrying a valve for the purpose of closing the air passage when the apparatus is not in action, and allowing it to open when in operation.

The improved apparatus for supplying the air consists of a series of moveable bells or chambers arranged round a verticle revolving shaft, which is provided with cams for lifting the said bells or chambers, and allowing them to fall. These moveable chambers or bells dip into water reservoirs, so that their bottom edges are constantly sealed. As they are lifted a valve in their other part allows the air to fill them, which is delivered to an air reservior, or to the carburetter, by their weight when falling. The air-forcing bells or chambers may also be operated by a horizontal shaft with cams or lifters.

919.—NEWTON, A. V., Chancery Lane, London, "*Improvements in the construction and setting of retorts and in processes of operating retorts for the manufacture of illuminating gas.*" A communication. Patent dated March 13 1874.

This invention consists generally in certain novel constructions of the retorts, and in the damper and flue arrangements for heating the retorts, including the following among other peculiarities, namely:—

The retorts are made with their back halves or portions wider on their bottoms than about their front halves or portions, to give bottom surface and capacity in their back parts, or enlarged portions of the retorts, for the whole charge of coal or substance being distilled, whereby a more equal time and distance is obtained for the passage of all the vapour distilled from the coal through and out of the retorts, and a more thorough and general contact of such vapours with the hot surfaces of the retort is produced.

Furthermore, the retorts are, or may be, made with outer transverse ribs arranged to strengthen the arched top of the retorts, and to form a support or bearing for the superincumbent retort or retorts to rest upon when set up for use in the oven.

The invention also embraces a process of distilling the whole of the charges of coal in about the back halves of the retorts or any other portions of the retorts, by which any portion of the bottom of the hot front ends of the retorts are left free from coal in excess of what occurs under the usual mode of operation in retorts of the ordinary or any other form.

Likewise the invention in part consists in a novel process of manipulating retorts and the charges of coal and residual coke for the manufacture of illuminating gas, whereby there is obtained an increased quantity of gas from a given amount of coal distilled, and a better quality of gas from the charges of coal in the retorts of any required amount, and at any required period of distillation, without of necessity involving any change in the construction of the apparatus now used, excepting, if convenient, having duplicate or light sheet-iron lids to temporarily close the mouths of the retorts for the purpose of excluding the air after the charge is drawn, so as to admit of the retort being heated while empty to a proper temperature before a succeeding charge is placed therein for distillation. These lids may be used without luting, or the ordinary lids may be employed instead.

934.—HILLS, F. C., Deptford "*Improvements in the purification of gas and gas liquor.*" Patent dated March 14, 1874.

This invention is described and illustrated in the present number of the JOURNAL, page 604.

935.—HOLLAND, H., Birmingham, "*New or improved apparatus for charging atmospheric air with the vapour of hydrocarbon liquid.*" Patent dated March 14, 1874.

According to this invention, a box is constructed of tin or other suitable material, and fitted up with shallow trays, placed one over the other, to contain the hydrocarbon liquid. Near the end of each tray a slit or aperture, extending across the whole breadth of the tray, is formed, and furnished with sides uprising to about half the height of the sides of the trays. These apertures are formed alternately at opposite ends of contiguous trays, and answer the purpose of waste-pipes to conduct the hydrocarbon from one tray to that next below it, when the liquid in the former rises to a higher level than the sides of the aperture.

The hydrocarbon is poured by a funnel into the uppermost tray, which it fills to the top of the waste aperture, and then falling into the trays below, fills them also in succession. When the hydrocarbon issues from a stop-cock provided at the bottom of the box, a sufficient quantity has been introduced.

The air to be carburetted is forced in at the bottom of the box, and passing upwards through the apertures in the several trays, has exposed to it in such passage the surface of the hydrocarbon in each tray successively; and thus by

the time it reaches the top it is thoroughly saturated with the vapour thereof, and is then conducted away for combustion.

939.—TRULON, G. A., Hampstead, Middlesex, "*Improvements in cylinder engines and pumps.*" Patent dated March 16, 1874.

The object of this invention is to increase the effective force of the motive power employed, and consists in the employment of a projecting thread for the two reversed portions of screws on the surface of the drum, acted upon by two friction rollers or lateral projections from each piston or other rod actuating or actuated by it, and also in an arrangement of additional cylinders.

942.—ALLIOTT, J. B., Radford, Notts, "*Improvements in the construction and arrangement of engines worked by steam or other fluid pressure, which engines are also applicable as pumps for raising and forcing, or as meters for measuring fluids.*" Patent dated March 17, 1874.

This invention relates to that class of engines and pumps which has the working cylinders arranged radially around a central space, to which their inner ends are open, and which contains the end of the main-shaft which they drive or from which they are driven. It is proposed to form in the main-shaft of such engines or pumps, suitable grooves or passages so as to enable it to act as the valve for distributing the steam or other fluid. Where a rotating valve is used it is made conical in order to avoid leakage through wear, and a spring is used for keeping the valve up to its bearings. Where a cylindrical valve is used for the purpose of distributing the fluid to the various cylinders, the inlet and outlet passage is channelled or grooved on its cylindrical surface, by which means the valve may be kept substantially *in equilibrio*, and metallic spring rings (similar to piston rings) are used to prevent the leakage of steam or fluid along the cylindrical valve longitudinally. Instead of arranging the cylinders so that their axes and those of their connecting-rods lie all in one plane, they are arranged in two or more parallel planes so as to simplify their connexions to the crank-pin. It is proposed to employ guides for the pistons so constructed and arranged as not to yoke or couple any two pistons together. The valves are placed at or upon the outer ends of the cylinders so as to obtain as short steam passages as possible between the valve and the cylinder, and the valve-rods are actuated by means of a sleeve on the crank-shaft (being in effect a series of cams) with which the valve-rods are kept in contact by means of springs so as to enable a variable "cut-off" to be obtained by the direct action of the governor to which such sleeve is connected. Where a reversing motion is adopted and a rotary valve is employed, a separate piece is placed in the steam-port of such valve free to move from side to side of the port in the direction in which the valve rotates, and driven along with the valve by contact with the following side of its port, for the purpose of acting as a movable "lap," and permitting the steam to be used expansively. A reversing motion in such engines is obtained by so constructing and arranging the crank that it can be turned a portion of a revolution upon its crank-shaft.

Where such engines are used for driving centrifugal machines, the engine is placed within the space around the central shaft of the machine, and in the same plane as the centrifugal basket, in which case the cylinders may be cast in one piece with the central cone of the basket, and revolve therewith, whilst the central shaft (instead of revolving remains stationary. It is proposed in such engines to work one or more of the cylinders with steam, which has been previously used at a higher pressure in one or more of the other cylinders, and in some cases to use the exhaust steam from one or more of the cylinders worked on the non-conducting system, for supplying steam to others of the cylinders exhausting into a condenser, and in engines so arranged to use a single conical valve to distribute the high-pressure steam to the high-pressure cylinder or cylinders, and the exhaust steam therefrom to the lower pressure cylinder or cylinders, and when desired the exhaust steam therefrom get again to other cylinders. It is also proposed to use in such engines one cylinder or cylinders having its connexion-rod working only in compression, whilst the connexion-rod or rods of the other cylinder or cylinders of the same engine are subject only to extension. When such engines are used for pumping purposes, it is proposed to use one or more of the cylinders as a pump or pumps, whilst the remaining cylinder or cylinders is or are used with steam.

It will be understood that instead of using the cylinders as pumps for raising or forcing liquids they may also be used for exhausting air or gas, and that by the addition thereto of any suitable counting mechanism they may be employed as meters for measuring liquids of aëriform fluids.

In such engines and pumps the crank-shaft is made conical, and supported in a moveable conical bearing, so that the wear of the shaft may be readily compensated without throwing the crank-shaft itself out of its central position, and the bearing is arranged in such a way that the setting up of the same shall cause it to partially revolve so as to present a fresh surface to any point at which the wear may be uneven.

946.—WARNER, W. J., Gas-Works, South Shields, "*Improvements in gas-meters.*" Provisional protection only obtained. Dated March 17, 1874.

The measuring drum, wheel, or cylinder of a wet meter, as ordinarily constructed, is more or less affected by the variation of the water-line, the rising of it lessening the capacity, and the lowering of it increasing the capacity; the variation arising from the measurer in action being but an annulus by the water being above the axis of the wheel.

These improvements are in the construction of a wheel having within it an inner wheel of the same make as the ordinary wheel, but with its inlets at the back of the measuring-wheel, and its outlets opening into the measuring-chambers or quarters of the wheel. The radius of the inner wheel is that of the highest water-line above the axis of the meter, or about that, and so corresponds with the internal dead portion of the ordinary wheel. The depth of the wheel is that of half, or about half, the depth of the ordinary wheel. Now, as the inlets of this inner wheel are open to the outlet of the major or measuring-wheel, it will be seen that as the major wheel revolves the smaller chambers (if the water be lower than the highest water-line) must be filled with measured gas; and as the outlets open into the large chambers of the measuring-wheel as they are filling, there must be, at each revolution of the wheel, a quantity of gas brought back from the measured portion equal to the annulus of the inner wheel, and as the capacity of the inner wheel varies with and is in the same ratio, and directly as the variable portion of the measures of the major wheel, there will be no practical variation in the measurement by variation of the water-line.

Instead of the inner or compensating wheel being within and attached to the measuring-wheel, a separate wheel or drum may be used for extracting the compensating portion of measured gas, and driven by the ordinary measuring-wheel at a rate proportionate to the capacity of the compensating-wheel.

972.—MIRRLEES, J. B., Glasgow, "*A new or improved pumping-engine.*" Provisional protection only obtained. Dated March 19, 1874.

This invention of an engine, which is adapted both for exhausting as well as forcing liquids and fluids, consists in a combination of the engine known as "Robertson's Valveless Engine," with a horizontal air-pump, wherein the exhausting or forcing action is produced by the alternate rising and falling of columns of water or other liquids in the two chambers of the pump, through which the piston or plunger is reciprocated by the action of the engine. The piston or plunger of the pump is made hollow, and as thin as possible consistent with the work it has to perform, and passes through a broad bearing in the division between the two chambers. The upper parts of the pump-chambers are provided with valves for the purpose of allowing the ingress or egress of the liquids or fluids. The engine and pump are so situated that the piston-rod of the engine is in line with the axis of the pump plunger, and the crank-pin of the fly-wheel shaft is coupled by a universal joint to the vibrating arm on the piston-rod, thereby allowing the partial rotating action of the piston peculiar to the class of engines mentioned.

Share List,
OF
Metropolitan Gas and Water Companies.

(*Corrected by Mr. F. N. GOLDING, Sun Court, Cornhill, from the latest Stock Exchange Quotations.*)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	14 — 16
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — 11
1000	20	Do., preference	20 0 0	10 0 0	25 — 27
1000	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
1500	20	Do., perpetual preference	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	20 0 0	7 10 0	20 — 22
10000	5	Do., fourth issue	5 0 0	6 15 0	6½ — 7
10000	20	British (Limited)	4 0 0	6 15 0	1—1½ pm.
		(Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	34 — 35
7500	20	Cagliari (Limited)			
180000	10	*Chartered* A ordinary	20 0 0	7 0 8	14 — 16
25000	10	Do. A, 5 per cent. preference	10 0 0	10 0 0	16½—17½ xd
20000	10	Do. A, 5 per cent. do., 2nd issue	10 0 0	5 0 0	15½—16½ xd
30000	10	Do. A, 5 per cent. do., 3rd issue	10 0 0	5 0 0	15½—16½ xd
10000	10	Do. B, 4 per cent. maximum	10 0 0	5 0 0	4¼—4½ pm.
20000	10	Do. C, 10 per cent. preference	10 0 0	4 0 0	7 — 7½
12000	25	Do. D, 10 per cent. preference	10 0 0	10 0 0	20½— 21½
4438751.	8k.	*Commercial*	25 0 0	10 0 0	51 — 53
20000	20	Continental Union	100 0 0	10 0 0	170 —172
20000	20	Do., new	20 0 0	8 0 0	19 — 20
10000	20	Do., preference	12 10 0	8 0 0	1 dis.—par
		(Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24 — 26
5000	10	*Crystal Palace District*			
5000	10	Do., preference	10 0 0	10 0 0	16½— 17
10000	10	Do., ordinary	10 0 0	6 0 0	11¼— 12½
2500	10	Do., converted	10 0 0	7 0 0	12¾— 13¾
2500	10	Do., converted	2 0 0	10 0 0	1¾— 2 pm.
23496	10	European (Limited)	2 0 0	7 0 0	1 —1½ pm.
12000	10	Do., new shares	10 0 0	10 0 0	14 — 15
	10	Do., new shares	7 10 0	10 0 0	2½—3 pm.
		(Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	1¾—2¼ pm.
4054	10	Foreign and Colonial (Limited)			
5000	10	Hong Kong (Limited)	10 0 0	..	9 — 10
1560000	100	*Imperial*	10 0 0	10 0 0	14 — 15
78000	12½	Do., new shares	100 0 0	10 0 0	173 —176
1300	100	Do., bonds	12 10 0	7 0 0	16 — 16½
58000	50	*Imperial Continental*	£100	10 0 0	197 —200
		(Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	43 15 0	9 2 6	62 — 64
3000	40	*Independent*			
3000	10	Do.	40 0 0	10 0 0	66 — 68
3000	20	Do.	10 0 0	5 0 0	8½— 9½
4500	10	Do., D	20 0 0	7 10 0	25 — 26
378350l.	8k.	*London*	3 0 0	10 0 0	3 — 4 pm.
1500001.	8k.	Do., 1st preference	100 0 0	10 0 0	168 —171
14450	8k.	Do., 2nd preference	100 0 0	6 0 0	118 —121
4350	8k.	Do., 3rd preference	100 0 0	6 0 0	
7622	25	Do., A shares	100 0 0	6 0 0	
268051.	All	Do., Debenture stock	12 10 0	6 0 0	
15000	5	Malta and Mediterranean (Limited)	100 0 0	5l. & 6l.	
6000	5	Do., preference	5 0 0	3 0 0	2 — 3½
20000	5	Mauritius (Limited)	5 0 0	7 0 0	5 — 5½
25000	20	Monte Video (Limited)	2 0 0	7 0 0	2 — 2½
8000	10	Nietheroy, Brazil (Limited)	20 0 0	..	21¼— 22½
30000	5	Oriental (Calcutta)	10 0 0	..	
30000	5	Do., new shares	5 0 0	..	
10000	5	Ottoman (Limited)	2 10 0	9 0 0	7¼— 7¾
17500	10	Para (Limited)	5 0 0	9 0 0	1—1¼ pm.
27000	20	*Phœniz*	10 0 0	nil.	2 — 2½
3600001.	100	Do., new	20 0 0	7 0 0	6 — 8
1440001.	8k.	Do.	55 0 0	10 0 0	35 — 36
5000	20	*Ratcliff*	100 0 0	7 10 0	70 — 72
36000	20	Rio de Janeiro (Limited)	20 0 0	5 0 0	91 — 93
7359	5	Singapore (Limited)	20 0 0	10 0 0	33 — 35
2000	5	Do., preference	5 0 0	10 0 0	31 — 33
1500	32½	Shanghai	5 0 0	7 10 0	4½— 5
4000	50	*South Metropolitan*	32 10 0	7 10 0	5½— 6
4000	12½	Do.	50 0 0	12 0 0	30 — 32
20000	12½	Do., new shares	12 10 0	10 0 0	85 — 87
15000	10	*Surrey Consumers*	5 0 0	10 0 0	21 — 21½
10000	10	Do., new	10 0 0	10 0 0	6¼— 6¾ pm.
9000	4	United General (Limerick)	7 0 0	10 0 0	16½— 17
1500	10	*Wandsworth and Putney*	4 0 0	2 10 0	5 — 6 pm.
1500	10	Do.	10 0 0	10 0 0	2 — 2½
2957	10	Do.	10 0 0	7 10 0	14 — 15
993	10	Do.	10 0 0	7 0 0	11 — 12
16000	5	*West Ham*	3 0 0	7 0 0	
10000	5	Do., new shares	5 0 0	10 0 0	7¾— 8
			2 10 0	10 0 0	3 — 4
		WATER COMPANIES.			
12000	100	Chelsea			
1800000	100	East London	100 0 0	6 0 0	126 —128
8000	50	Grand Junction	100 0 0	6 0 0	130 —132
3340	25	Do., ¼ shares	50 0 0	7 0 0	77 — 79
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 0 0	36¾— 37¼
4396	100	Kent	25 0 0	7 0 0	31 — 33
5339	100	Lambeth	100 0 0	6 10 0	131 —133
1161	100	Do.	100 0 0	6 5 0	127 —129
442	100	New River	20 0 0	6 5 0	
4475	100	Do.	100 0 0	8 0 0	170 —180
400000	100	Do., debenture stock, 4 per cent.	50 0 0	8 0 0	50 — 55
3036	100	Southwark and Vauxhall	100 0 0	4 0 0	97 — 99
1296	100	Do., preference stock	100 0 0	5 5 0	109 —111
	100	Do., D shares	100 0 0	5 0 0	103 —105
		Do.	100 0 0	5 5 0	108 —110
	100	Do., new ordinary	..	4 10 0	
1600	100	Do., new ordinary, No. 1		4 10 0	
12172	61	West Middlesex	40 0 0	4 10 0	
			61 0 0	£6 per sh.	135 —136

APPLICATIONS FOR LETTERS PATENT.

3658.—PARKER, T., Birmingham, Warwick, and WESTON, P. A., Coalbrookdale, Salop, "Improvements in direct-acting pumps worked by steam, compressed air, or water." Oct. 23, 1874.

3661.—HOOKER, W. D., St. Julian's Road, and BROWNE, S. G., Cavendish Road, Kilburn, London, "Improvements in steam-engines and steam-regulators attached thereto, also in pumps and pump-valves worked by said engine." Oct. 23, 1874.

3672.—GREENACRE, T., Turner's Road, Burdett Road, London, "Improvements in means or apparatus for manufacturing screws of vulcanite or other analogous material for liquid-meters." Oct. 24, 1874.

3687.—HOLMAN, S., Laurence Pountney Lane, London, "Improvements in apparatus used in the manufacture of gas." Oct. 26, 1874.

3699.—HAMBLETON, F. H., Baltimore, U.S.A., "Improvements in apparatus to admit of the continuous running of a pump or other apparatus supplying fluid through pipes when the flow through the pipes is for a time wholly or in part arrested, without injury to the pipes and without waste of fluid." A communication. Oct. 26, 1874.

3717.—CHANDOR, J. A., New York, U.S.A., "Improvements in ignition fuses, and in the means for igniting the same, applicable to lamps, gas-burners, and other like purposes." A communication. Oct. 27, 1874.

3619.—PAGET, F. A., Seymour Chambers, Adelphi, London, and Riemer Gasse Stadt, Vienna, "Improvements in centrifugal pumps for raising and forcing liquids, and in centrifugal pumps or fans for exhausting and blowing gases." A communication. Oct. 27, 1874.

3720.—POLLARD, W., and CARTER, J. E., Halifax, Yorks, "Improvements in the method of and apparatus for regulating the pressure and supply of gases and fluids." Oct. 28, 1874.

3735.—TYLOR, A., Newgate Street, London, "Improvements in water-closets, lavatories, and other apparatus relating to sanitary arrangements and the parts connected therewith; also in the cocks, valves, ball or float valves, hydrants and apparatus for containing, measuring, controlling, regulating, and arresting the water supply of the same, and for other purposes." Oct. 29, 1874.

3741.—HOLLANDS, E. R., Stoke Newington Green, South Hornsey, and CUBITT, L. W., Church Road, Islington, London, "Improvements in the construction of irons to be heated by gas." Oct. 29, 1874.

GRANTS OF PROVISIONAL PROTECTION.

3017.—WALLER, R., Charlotte Street, Fitzroy Square, London, "Improvements in the construction and arrangement of engines and apparatus for and in connexion with the use of steam, vapours, air, carbonic acid gas, and other gaseous matters, as a source of motive power." Sept. 3, 1874.

3567.—ASHWORTH, G., and ASHWORTH, E., Manchester, Lancs, "Improvements in steam-pumps or pumping-engines." Oct. 17, 1874.

3577.—COLEMAN, J. J., Glasgow, "Improvements in the production of volatile liquid hydrocarbon from hydrocarbon gases, and in the apparatus employed therefor." Oct. 17, 1874.

NOTICES TO PROCEED.

2103.—RAFFERTY, T., Manchester, Lancs, "Improvements in apparatus used in connecting service-pipes, cocks, and plugs to main gas-pipes." June 17, 1874.

2185.—GAMBONI, P., Harley Street, London, "Improvements in pumps or apparatus for raising or forcing air or water." June 23, 1874.

2569.—NEWTON, W. E., Chancery Lane, London, "Improvements in gas-burners." A communication. July 22, 1874.

3281.—DAY, ST. J. V., Glasgow, "Improvements in the manufacture of gas and in the means or apparatus employed therefor." A communication. Sept. 26, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1550.—KNOWLES, Sir F. C., Bart., Lovell's Hill, Berks, "Improved manufacture of gas for heating purposes." May 2, 1874.

1567.—LOWNE, B. M., East End, Finchley, Middlesex, "Improvements in anemometers and other fluid-meters." May 4, 1874.

1711.—BEALE, J., East Greenwich, Kent, "An improved engine to be used for pumping gases, air, or fluids." May 14, 1874.

1732.—UNDERHAY, F. G., Crawford Passage, Clerkenwell, London, "Improvements in apparatus for drawing off water to prevent or reduce waste." May 15, 1874.

1916.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in apparatus for filtering or separating liquids from solid matters contained therein." A communication. June 2, 1874.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2778.—TAYLER, W. H., "Improvements in stoves for burning gas, or gas and air, for general heating and cooking purposes." Oct. 18, 1871.

2795.—DUFFEE, E., "Improvements in screens for coal-gas purifiers." Oct. 19, 1871.

2815.—HUGHES, E. T., "An improved liquid-meter." Oct. 21, 1871.

2832.—SPENCE, P., "Improvements in the treatment of oxide of iron which has been used in the purification of illuminating gas, for the purpose of again making it available for that process, and also for the manufacture of sulphate and nitrate of iron." Oct. 23, 1871.

Notes and Queries.

R. A. Green, Carrickfergus, writes: "In reply to the query of W. D., in the JOURNAL of the 20th inst., I beg to inform him that the general calculation for dry lime purifiers in this part of the world is one superficial yard of sieve for every 1000 feet of gas made per diem. Consequently, for a daily make of 170,000 cubic feet, he will require four purifiers, each 10 feet square, having four rows of sieves each."

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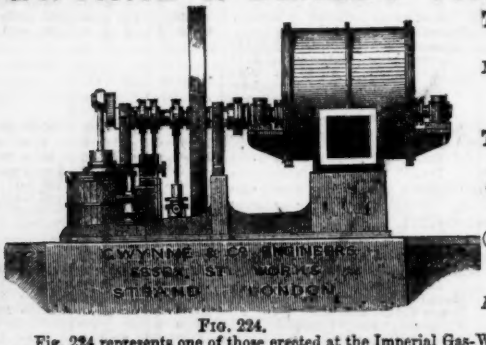

FIG. 224.

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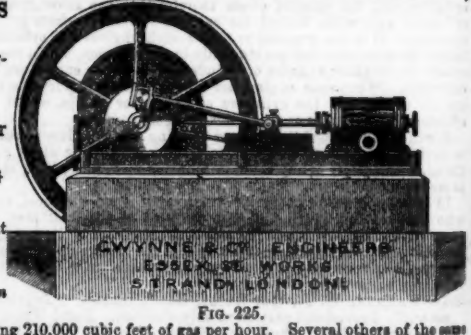

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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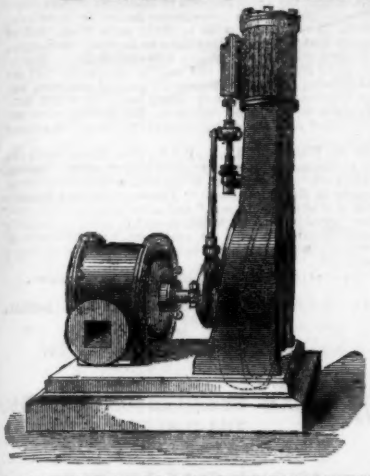

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ENGINE COMBINED

ON

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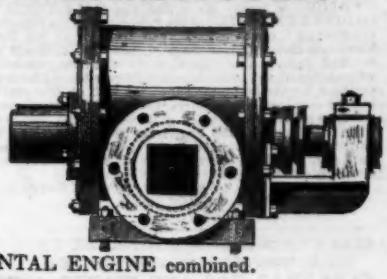

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Drighlington and Gildersome Gaslight Company.
Office, Gas-Works, Drighlington,
Oct. 28, 1874.

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DIXON ROBINSON, Clerk to the Company.
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Gas Office, 56, High Street, Rochester.

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THOS. TREWHITT, Secretary.
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Gas Offices, Shipley, Oct. 28, 1874.

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Notice is hereby also given that the Transfer Books of the Association, and the Register of Shareholders, will be closed on Tuesday, the 10th inst., and will remain closed until after the Half-Yearly Ordinary Meeting on the 24th inst.—By order of the Board of Directors,

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We submit the above Burners to Managers of Gas Companies as being worth a recommendation to their consumers. Though the price is little more than that of common Burners, we believe them to be nearer perfection, for general use, than any others, however costly.

By many important gas and railway companies they are used as being the best obtainable for general purposes, and have supplanted enormously costly burners, which have been made to give good results in the testing-room, but which fail of their effect when brought to the test of general use.

Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner to the City of Glasgow, in a lecture on the "Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow in March last, says: "These are the best Burners obtainable at moderate cost," and, after mentioning several other "good" Burners, which ranged in price up to thirty times the price of ours, he continues, "but these are all costly, and their performance is no better than that of Bray's Burners."

GEORGE BRAY AND CO., BLACKMAN LANE, LEEDS.

INTERNATIONAL EXHIBITION, 1862.

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(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

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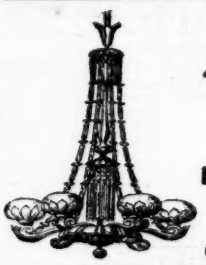

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STEAM-ENGINES and EXHAUSTERS, separately or combined.

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A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

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ROUND STATION-METERS,

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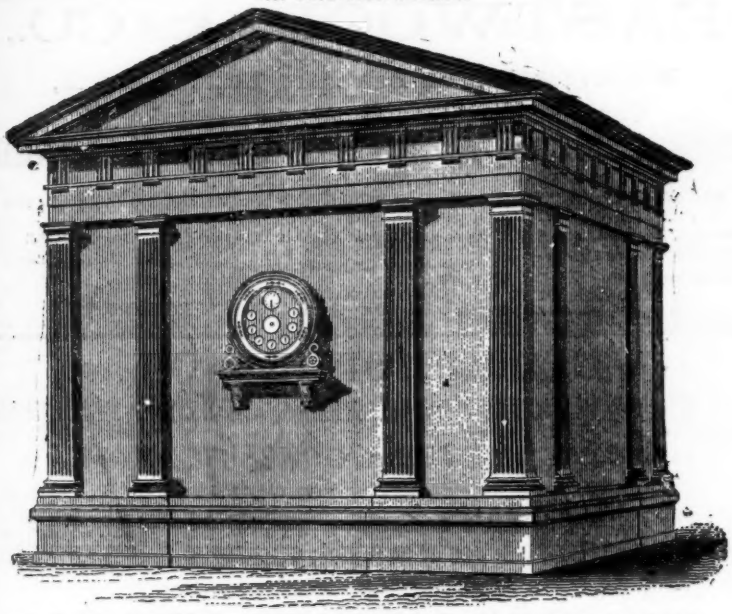

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WATER-METERS SUITABLE FOR ALL PRESSURES.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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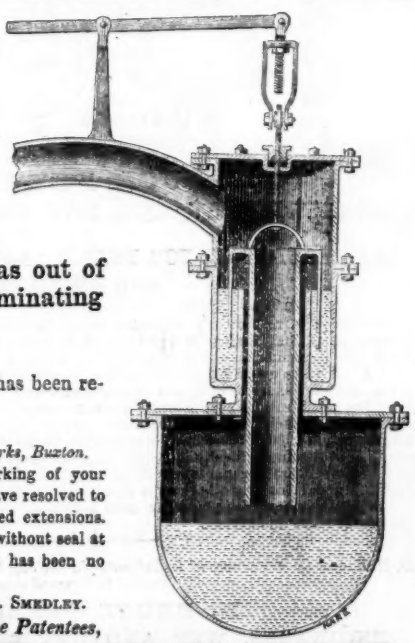
The advantages are—

1st, There is no pressure on the Retorts.
2nd, No deposit of Carbon.
3rd, No scurfing required.
4th, Never a choked Ascension Pipe.
5th, Saves Fuel and Wear and Tear.
6th, Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7th, Is never out of order.



The following (among other letters) has been received :—

Messrs. Chandler and Sons.

Manager's Office, Gas-Works, Buxton.

Gentlemen,—I am so satisfied with the working of your Patent Dips during the last five months that I have resolved to recommend the adoption of them in our proposed extensions. I find it under perfect control to work with or without seal at pleasure, and that during the whole time there has been no deposit of carbon.—Yours, &c.,

Jan. 21, 1874. GEO. SMEDLEY.

For terms of use and cost, apply only to the Patentees,

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Competent workmen sent out to town or country.

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Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.
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POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
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N.B.—A quantity of Retorts in stock. Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in. D's, 15 in. by 13 in.; 16 in. by 12 in.; 18 in. by 14 in. 20 in. by 16 in.; 21 in. by 14 in.; and 24 in. by 14 in.

GAS AND WATER PIPES.
WILLIAM MACLEOD & CO.,
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
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AND FOR THE
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AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

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SHOEBURY AND KENT STOCKS, AND SUFFOLK RED AND WHITE BRICKS DELIVERED IN ANY QUANTITIES, OR BY BARGE ALONGSIDE.
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Grey Stone Lime, FLARE LIME Chalk Lime, Blue Lias, Roman and other Cements.
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GAS METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,
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CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.
STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,
And every Description of Gas Apparatus.
GAS, STEAM, AND WATER FITTINGS.

D. BRUCE PEEBLES & CO.'S
PATENT
LAMP REGULATOR

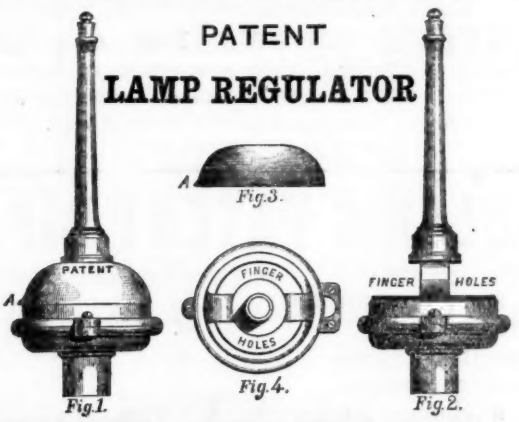

Fig.1. Fig.3. Fig.4. Fig.2.

D. BRUCE PEEBLES AND CO.,
ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,
PATENTEES OF
GAS REGULATORS FOR PUBLIC LAMPS, FACTORIES, PUBLIC HALLS, AND DWELLING-HOUSES.

Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—
"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."
Since the above date, another 1000 have been supplied to Glasgow, and they are being largely adopted at home and abroad.

D. B. P. and Co. are prepared to Estimate for the Supply and Maintenance of their Regulators, and will be glad to forward terms on application.

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ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,
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Delivery per Rail to any Part.

LIME SUPERSEDED
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PURIFICATION OF ILLUMINATING GAS
BY
SPENCE'S PATENT DRY COPPERAS.

The only purifying material which removes by one process, without injury to the purifiers, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of five years at some of the largest Gas-Works in the Kingdom.

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CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.
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Established 1840.

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RUSSEL'S BOGHEAD.

MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL
Yields 12,550 cubic feet of 33-candle gas per ton.
Prices and full Analyses on application.

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THE DUNKIRK COAL COMPANY.

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THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·9	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851;
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(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

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MANUFACTURERS OF

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Of the highest excellence.

STATION-METERS AND GOVERNORS.

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TESTING APPARATUS

Of the most perfect description for all purposes relating to Gas.

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.

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Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

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FIRE GOODS, and Salt-Glazed Drain-Pipes.

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, November 3, 1874.